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THE PSYCHOLOGICAL REVIEW

THEORETICAL STUDIES FROM THE HARVARD PSYCHOLOGICAL LABORATORY

ANALYSIS: A CONTRIBUTION TO PSYCHOLOGICAL METHOD¹

BY ALBERT J. HARRIS

Cambridge, Mass.

I

The problem of analysis has troubled psychologists for years, and is still far from being settled. Certain men have considered analysis to be extremely important. According to Titchener, for instance, "the psychologist seeks, first of all, to analyze mental experience into its simplest components. He takes a particular consciousness and works over it again and again, phase by phase and process by process, until his analysis can go no further."^{1a} Other men, however, are definitely against the use of analysis in psychological investigation. Thus for Koffka "the analytical method can, according to this way of thinking, only find out into what kind of reactions other reactions can be transformed by the change of attitude called psychological analysis."²

This paper is an inquiry into the validity of analysis as a psychological method. Before proceeding to consider its use in psychology it may be well to discover the various meanings which have been given to the term.

¹ Communicated by J. G. Beebe-Center.

^{1a} Titchener, E. B., 'Textbook of Psychology,' 1910, p. 37.

² Koffka, K., *Brit. J. Psychol.*, 1924-5, 15, p. 155.

II

Analysis may be roughly defined as a method of investigation in which knowledge about something under investigation is sought by considering it in detail. Throughout the discussion the words 'object' or 'thing' are used to denote that which is under investigation, without regard to its actual nature.

As various kinds of things may be investigated, it is obvious that there may be various ways of investigating them, and that methods which are applicable to some things are not applicable to others. For a clearer understanding of what analysis is, it is necessary to enumerate the various possible ways of analyzing.

A first process is that of *deduction*. For a definition of deduction we must go to logicians. A typical statement is that of Jevons: "As generally stated, deduction consists in passing from more general to less general truths; induction is the contrary process from less to more general truths. . . . In deduction we are engaged in developing the consequences of a law. We learn the meaning, content, results, or inferences, which attach to any given proposition."³

Deduction is a logical process, dealing with propositions. If we turn from propositions to other objects, we find that there are various methods of analyzing them, which are best revealed when we consider what types of questions may be asked about the object. We may ask: What are its parts, and their relations? What are its aspects, and their relations? What are its constituents, and their relations? and What are its relations with other objects?

When we consider an object as a whole composed of parts, it is invariably something meaningful, something with structure and function. When we ask what the *parts* of an object are, we immediately come to the question of the relation of the parts to the whole. The word 'part' implies the existence of a whole, otherwise it is meaningless. A thing cannot be a part unless it is a part of something. In describing a whole with reference to its parts, one must be careful not to lose sight of the

³ Jevons, W. S., 'Principles of Science,' London, 1905 ed., p. 11.

nondetachability of the parts. So, in describing a door, it would be well to say: "This is a door. It has so many panels-of-this-door, placed in such and such an arrangement, with a doorknob-of-this-door on one side, placed so and so, and two hinges-of-this-door on the other side, placed so and so." The expression 'of-this-door' has been used to emphasize the fact that a meaningful part can in no sense be considered interchangeable with parts of other wholes. Thus a plank-in-a-staircase cannot become a plank-in-a-door in anything but a physical sense; to claim such a thing psychologically is to substitute the external object for the experience. The parts, as enumerated, are all meaningful objects also; when they are enumerated with their relations, they give the whole. Such a description of an object by an exhaustive enumeration of its observable parts and their relative positions may be called a *meaningful analysis*.

The question about the *aspects* of the object brings up an entirely different kind of description. We can notice an object from many points of view. For instance, we can notice the color, brightness, warmth, shape, symmetry, hardness, weight, beauty, etc., of our door. This involves considering a certain aspect of the door and comparing it with like aspects of other objects. It is evident that the object has as many aspects as there are points of view which may be taken towards it. Seemingly, therefore, there is an infinity of aspects to every object, of which we can select certain ones in describing it. The relation between the aspects seems to be only an "and-relation";⁴ it may be, however, that the aspects fall into certain natural groups. This type of description we may call *aspective analysis*.

The next mode of inquiry deals with the *constituents* of the object. By constituents I mean the materials which go into the composition of the object. The materials of our door would be, superficially, wood, iron, steel, brass, glue, and varnish; more fundamentally they would be molecules, atoms, or, finally, electrons. These constituents are discovered by two methods. The first is that of direct partition. By this

⁴ Cf. Johnson, W. E., 'Logic,' Cambridge Univ. Press, 1921, Part I, p. 112.

method the object is split directly into its constituents; the constituents are separated out, and thus can be examined. In such a way the wood, iron, etc., could be discovered. To discover the molecules, atoms, or electrons, however, partition is useless, because our technique of partitioning is not adequate to the task. In finding these no attempt is made at actual partition, but certain elementary constituents are assumed, and then proved on the basis that such parts, and no others, will account for certain facts which are known. Of this type is the proof of the existence of atoms.⁵

As with the parts, the relations between the constituents of an object are usually found when the constituents are found or proved. Often the discovery of the constituents and their relations is considered a single type of analysis. Thus we find Spaulding saying: "Given a whole which, for one reason or another, is known to be analyzable, then analysis reveals parts, but *it also reveals the relations* which relate and so organize these parts into some kind of whole. . . . The analysis may be incomplete in the sense that there may be further parts, that is, parts of parts, which are not yet revealed; but, if the analysis is incomplete only in this sense, that is, if there have been revealed parts, their organizing relations, *and*, in some cases, the possibly specific properties of the whole, then the analysis may be said to be complete."⁶ The context shows that by 'part' Spaulding means what I have here called a 'constituent,' not what I have discussed under meaningful analysis.

We come finally to the question of the *relation* of the object with other objects. This is the special province of scientific experimentation, as here the effects of quantitatively controlled variations can be studied. From the results of such relational experiments it is possible to subsume the individual facts that are found under general laws, and thus to prepare the way for scientific prediction. It may be objected that this is a method of investigation, but not of

⁵ Cf. Spaulding, E. G., 'A Defense of Analysis,' in 'The New Realism,' New York, 1912, pp. 225-7.

⁶ *Ibid.*, p. 161.

analysis. However, this method of procedure is precisely what the physicist usually calls analysis. A good illustration of how it is used is seen in the procedure for confirming the atomic theory, as mentioned above. We may call this method *relational analysis*.

In summary, then, we may say that analysis may have the following meanings: deduction, meaningful analysis, aspective analysis, analysis by constituents, and relational analysis.

III

Let us now consider the use of these various types of analysis in psychology.

Deduction is a method of analyzing propositions. Propositions may be considered either as objects of investigation or as instruments for the investigation of other objects.

In the latter case deduction is a form of analysis whose use is legitimate in psychology, but which deals not directly with the object under investigation, but with certain instruments used in this investigation. The psychologist must use methods of observation and experimentation to establish his propositions, with which he may then work deductively—and inductively—on a systematic level.

In the former case propositions may be considered as immediate mental data in themselves; they will then lose the specific character which makes them 'propositions.' Deduction will then be a statement of a relation between certain mental data; given the two premises, the conclusion follows. The study of this relation will bring in facts about correlation, trial and error in thought processes, etc. In this approach deduction is subsumed under the category of relational analysis, and the conclusions to be drawn later about this form of analysis will apply to deduction as a sub-class.

The validity of *meaningful analysis* is a matter of observable fact. Our everyday experience shows us that we do experience wholes involving parts. The method is widely used—literature abounds with it—and its validity has never been questioned, as far as I have been able to discover. Even a man as critical of analysis as Köhler has accepted it.

"From the standpoint of Gestalt psychology there is after all *one* analysis which is perfectly genuine, allowed, and productive in all cases, the simple description of the field in terms of real units and sub-units as their real parts in terms of their boundaries, sub-boundaries, etc."⁷ It may be objected that when we have finished such an analysis we have not really got very far. But the objection, even if true, does not affect the validity of the method, since it only says that this type of analysis is not the whole of psychological procedure.

How far can one go in a meaningful analysis in psychology? Can one legitimately separate a part from the whole, and consider it by itself? The Gestalt psychologists say no: that the part cannot be considered separately from the whole. An essential characteristic of the part is that it exists in the whole, and when it is removed from the whole, not only is the whole broken up, but the part itself is changed.⁸

Titchener originally thought that one could make such a separation. His sensations were at once constituents and real parts of experience. They were 'elementary mental processes,' simple in nature, which could be analyzed out of the total experience, and which remained unchanged under attempts at further analysis.⁹ Their stability when extracted was exactly what made the extraction valid.

Do we find such permanent and unchangeable parts in our experience? Köhler says that we do not and can not. We do not see a cloudless sky of uniform blue as bits of blue, side by side, but as a continuous expanse. Sensations as observable molecules of experience simply are not found.¹⁰ This seems to me a simple and conclusive proof.

It may be argued that Titchener meant something different by his 'sensation'; that the criterion was qualitative uniformity, without any quantitative limits to a single sensation. Thus a two-inch red square would be one sensation, a single part of experience. This does not seem to me to be what

⁷ Köhler, W., *Ped. Sem.*, 1925, 32, p. 705.

⁸ Koffka, K., *Brit. J. Psychol.*, 1924-25, 15, p. 151.

⁹ Titchener, E. B., 'Textbook of Psychology,' 1910, pp. 37, 46.

¹⁰ *Op. cit.*, p. 695.

he meant in his early works, but we may suppose such a view and see what it implies.

The square must be perceived against some background or other. It is an experimentally established fact that the specific properties of the square—its brightness, size, color, etc.—depend to a considerable degree upon its background.¹¹ Since it is impossible to consider the square apart from all backgrounds, and since the specific properties of the square vary somewhat with the background, it would seem that any attempt to consider it apart from its background—to separate it out from the whole of which it is a part—will change the sensation. The Gestalt argument seems again to be conclusive. We may say, therefore, that analysis by parts is legitimate in psychology as long as no inferences are drawn as to the separate existence of the parts. We find that the experimental data verify the logical reasoning of the corresponding discussion in Part II.

Aspective analysis is also a widely used method of analysis. Johnson has gone so far as to call it the only true form of logical analysis.¹² Psychologists have been using it since they first began to describe; it is fundamental to any description. It might even be argued that 'partness' and 'wholeness' are aspects, and therefore that aspective analysis is implied in meaningful analysis.

Again the validity of the method is a question of observable fact. We can observe the color, extent, spatial position, etc., of a spot of light. Titchener and Bentley¹³ have come out strongly in favor of such a method; the Gestalt psychologists have never attacked its fundamental validity. Even Bergson has admitted its validity within its proper limits, although he objects to the attempt to synthesize the aspects to get the original whole again. The aspects are not real parts of the object, but views of it, and the object can no more be constructed from its aspects than it could from a series of photographs taken from different angles.

¹¹ Cf. Köhler, W., *op. cit.*, 710ff; Koffka, K., *Psychol. Bull.*, 1922, 19, 568ff.

¹² Cf. Johnson, 'Logic,' Part I., p. 111.

¹³ Cf. Titchener, E. B., 'Sensation and System,' *Amer. J. Psychol.*, 1915, 26, 259-265. Bentley, M., 'The Field of Psychology,' 1924, 34-51.

"For on the one hand these concepts, laid side by side, never actually give us more than an artificial reconstruction of the object, of which they can only symbolize certain general, and, in a way, impersonal aspects; it is therefore useless to believe that with these we can seize a reality of which they present to us the shadow alone."¹⁴ But Bergson is quite ready to grant that description by aspects is valid, when kept within its proper limits, and that it is practically useful, especially when used as a preliminary to scientific experimentation.¹⁵

We come next to analysis into *constituents*. Titchener's original sensations were both real parts and constituent elements. They have been disproved as the former; can they be retained as the latter? Köhler showed that they are not obtainable in experience; they would still be valid if by using them as concepts one can obtain a good explanation of the structure of the psychological object; one that would correlate with and explain the facts known about the object.

In his 1915 paper Titchener treated 'sensation' as just such a hypothetical unit; as the sum of those attributes of the object which are inseparably bound together as related to a single stimulus condition.¹⁶ Bentley similarly defined sensation as a logical construct, the sum of the 'simple' aspects of the object.¹⁷

One cannot criticize such a theory on the ground that the sensations are not discoverable; they are not supposed to be found. The validity of such a view rests largely on its predictive value.

As elements such as Titchener's sensations of 1915 are by definition non-observable, prediction requires that they have some invariable observable correlate which can indicate their presence or absence in any given case, and therefore imply the presence or absence of their consequences. Titchener and those with similar theories thought that they had such a relation between the stimulus and certain aspects of the

¹⁴ Bergson, H., 'Introduction to Metaphysics,' New York, 1912, p. 18.

¹⁵ *Ibid.*, p. 54.

¹⁶ Cf. Titchener, *Amer. J. Psychol.*, 1915, 26, 261.

¹⁷ Cf. Bentley, M., *op. cit.*, p. 51.

psychological object which varied in a certain definite relation to variations of the stimulus. Such a view is called the 'constancy hypothesis' by the Gestalt psychologists.

One who adopts the constancy hypothesis runs into certain difficulties. Experiments of the Gestalt psychologists have discovered many interesting facts which do not lend themselves easily to explanation on a basis of the constancy hypothesis. Köhler¹⁸ and Koffka¹⁹ have described many of these in detail. One of them is the problem of Stumpf's paradox.²⁰ One may state the problem as follows: it is always possible to produce three sensations, *a*, *b*, and *c*, so that *a* and *b* are judged equal, likewise *b* and *c*, whereas *a* and *c* are judged unequal. If a sensation is regarded as a function of its stimulus alone, there is a contradiction involved; if *b* is judged equal to *a* and to *c*, then *a* and *c* should also be judged equal.

Various attempts have been made to explain this phenomenon without discarding the constancy hypothesis, of which the 'friction' theory of Titchener and Ebbinghaus, G. E. Müller's 'chance-error' theory, and the theory of Cornelius are probably the most important.

Koffka says of these: "We have therefore a number of different explanations, which, however, apart from the rôle ascribed to attention, all possess the one common element: namely, they all start from the relation between a single stimulus and a single sensation, though this relation is modified by the friction theory, and still more by Cornelius. This modification, moreover, involves an addition of new factors, and accordingly we get a sum of different effects instead of a single effect.

"Shall we then say that all in all the problem has been solved; that the minor differences of opinion are really unimportant? My answer is no, for with no one of the existing theories can we predict a single case. Therefore, if we accept them, we must either exclude single predictions altogether from our programme—as chance can be only statistically

¹⁸ *Op. cit.*, 700ff.

¹⁹ *Cf. PSYCHOL. BULL.*, 1922, 19, 535-581.

²⁰ *Cf. ibid.*, 547f. for detailed exposition and references.

predicted—or we must await a discovery of the laws of attention, the outlook for which is not very helpful when we consider how ill-defined the concept of attention now is.”²¹

So far no one has been able absolutely to disprove explanations built on the fundamental concept of sensation. The reason seems to be that as more and more data inimical to such a view have been brought forward the defenders of the theory have postulated additional mental conditions, thus tending to make their theories cover more and more seemingly incompatible cases, and at the same time lessening the possible predictive value of their theories.

When we compare the practical experimental results obtained by those working under such a view with the results obtained by a contrasting view, we note a surprising difference. Certainly the productivity of the laboratories of Gestalt psychology has been more effective, if not actually greater than, that of those laboratories in which a sensationistic theory is retained.

It would seem, then, that sensation as an explanatory concept has not paid its way, since it has tended away from predictability, and has produced relatively little important work.

When we come to the study of *relations* of the object as a method in psychology we find it long-established, and in wide use at the present time. As far back as 1834 Weber performed an experiment in which he tested the relation of felt weight to the physical weight of the stimulus. Wundt and his followers used this method constantly. A typical example of their type of work is the determination of the relations between the brightness of the perceptual object and the intensity and wave-length of the stimulus.

Relational experimentation is also a fundamental method of the Gestalt psychologists. Wertheimer's famous experiment on seen movement is an excellent example. In this experiment the aim was to determine just what were the conditions which led to the perception of seen movement. In their experiments on configuration the Gestalt psy-

²¹ *Ibid.*, p. 539.

chologists have consistently studied the dependence of the perceived configuration upon the stimulus, the sense-organ, and the nervous system, with the aim of arriving at general laws on the basis of which they may be able to make single predictions.²²

The relations between two and more psychological objects, and the dependence of such relations on stimulus conditions and the physiological state of the organism, offer a practically inexhaustible field of research, including within its scope problems in perception, learning, memory, conceptual thinking, etc.

Titchener brought out an important point with reference to this type of experimentation: that it is necessarily performed with reference to a single aspect. One studies the hue, brilliance, form, dependence upon past perceptions, etc., of a perceptual object in separate experiments. One may study the relations between aspects, it is true. Such an experiment is the determination of the effect of different colors upon the size of the Müller-Lyer illusion. But even in such an experiment one is primarily concerned with one of the aspects, in this case with visual extent.

The continuance of this type of experimental procedure is assured. It is a method which all experimental psychologists use, and must use, to get definite scientific knowledge.

IV

What conclusions about the validity of analysis as a psychological method may we draw from this discussion?

In the first place, so far as observational analysis is concerned, we find that deduction is a method not applicable to the object of investigation, but rather to certain logical procedures at a systematic level; and that any analysis into observable elements or constituents seems to conflict with the facts. On the other hand we find that meaningful analysis, aspective analysis, and relational analysis are valid. These three types appear to form a progressive series in any exhaustive treatment of a psychological object. Meaningful

²² Cf. Helson, H., *Amer. J. Psychol.*, 1926, 37, 191-197.

analysis is the first stage; it is the presentation of the object as immediately experienced. Next there must be aspective analysis. Certain aspects of the object are selected, and within them in turn it is possible to carry out relational experiments, giving definite results on the basis of which general laws useful for prediction may be obtained.

In the second place, so far as analysis into inferential entities for theoretical purposes is concerned, there is no conclusive proof of its falsity. From the pragmatic point of view, however, the recent lack of success of such procedure tends to cast grave doubts on the validity of the method.

[MS. received July 18, 1928]

LEGAL PSYCHOLOGY¹

BY ROBERT M. HUTCHINS AND DONALD SLESINGER

Yale Law School

For centuries the law has been fumbling with what has only recently become the subject matter of psychology. Lawyers, judges, juries, legislators, and governmental officers have always vaguely known that their task was the prediction and control of human conduct. In performing this task they built up an empirical technique of regulation called the law, in every branch of which, from contracts to crimes, appear assumptions as to why and how people act in given situations. These assumptions may be those of the common man, such as the belief that severity of punishment will prevent recidivism, and that the gallows will keep down crime; or technical, such as the idea that telling the jury not to notice that the defendant has not taken the stand will effectually prevent them from noticing it.² Many of these assumptions date back to a time when psychology was still the irresponsible diversion of philosophers whose main interest was in something else. They were acted upon because men and women had to be controlled long before they were scientifically understood. Their survival depended upon the prestige of their promulgators, and the inertia of culture. In many cases they were taken from catch phrases of the day, or from the solemnities of the Bible. Thus the United States Supreme Court will now admit evidence of flight as tending to show consciousness of guilt, because the "wicked flee where no man pursueth, but the innocent are as bold

¹ The series of articles now appearing in various law journals and frequently cited herein grew out of a paper by Hutchins, read before the Council on Remedies, Association of American Law Schools, in December, 1926, and subsequently printed in more popular form in *Yale Rev.*, 1927, 16, 678. In this series, preliminary to experimental attack, the law of evidence is being analyzed in order to make explicit its psychological assumptions, and criticise them in the light of those of modern psychology.

² *People v. Tyler*, 36 Calif. 522 (1869).

as a lion."³ The Kansas Supreme Court allows the relations between the wife of the victim and the defendant in a murder trial to be shown because, it says, "It has been universally conceded since David wrote Joab, 'Set ye Uriah in the forefront of the battle and retire ye from him that he may be smitten and die' that the man who covets his neighbor's wife has a motive for desiring the death of his neighbor."⁴ And the common saying, "He has said it so often he believes it himself," has been thought to be the basis for the rule excluding the previous consistent statements of a witness to corroborate his story on the stand.⁵

Out of this technique of regulation has grown a rough and ready science of behavior which crystallized unfortunately before the dawn of modern psychology. As a result the suggestions of the new and rapidly changing discipline have been met by hostility on the part of the old. The psychologist was too confident, and overshot his mark.⁶ The lawyer snapped back and put the psychologist in his place;⁷ the psychologist then retired from the court room and left the law to muddle along in its own way. And it must be conceded that the lawyers have not done so badly. Where psychological experimentation has gone forward, it has revealed that the law has been frequently on the right track.⁸ And where its results look psychologically absurd, the psychologists have little to prove it. As Professor Hinton has lately said: "Silence as a manifestation of consent is primarily a question of psychology. How do persons in general react to various assertions of facts more or less prejudicial to their

³ *Hickory v. U. S.*, 160 U. S. 408, 422, 16 Sup. Ct. 327, 332.

⁴ *State v. Reed*, 53 Kan. 767, 774, 37 Pac. 174.

⁵ Cf. *Yale L. J.*, 1927, 36, 1162. In both of these rules the law is logically at fault. Even assuming that the wicked fled when no man pursueth, it certainly does not follow that all who flee are wicked. And if it were established psychologically that what one says often one comes to believe it would necessarily follow that prior consistent statements should be admitted to discredit a witness and not to corroborate his story.

⁶ Münsterberg, 'On the Witness Stand,' 1908.

⁷ Wigmore, 'The Psychology of Testimony,' *Ill. L. Rev.*, 1909, 3, 399.

⁸ Hutchins and Slesinger, 'Some Observations on the Law of Evidence: Spontaneous Exclamations,' *Col. L. Rev.*, 1928, 28, 432; 'Memory,' *Harv. L. Rev.*, 1928, 41, 860; 'Competency of Witnesses,' *Yale L. J.*, 1928, 37, 1017.

interests? Until the psychologists have collected adequate data, the courts must deal with such matters on the basis of general experience."⁹

If we take the law of evidence as an example, we find that for all their empiricism the legal profession is not unreasonably wrong. In some cases its conservatism is thoroughly commendable. Thus in *State v. Hudson*, deposition of doctor offered that he had given defendant a 'truth-telling serum' and defendant had denied guilt. "Testimony of this character is, in the present state of human knowledge, unworthy of serious consideration. We are not told from what well this serum is drawn or in what alembic its alleged truth-compelling powers are distilled. Its origin is as nebulous as its effect is uncertain. A belief in its potency, if it has any existence, is confined to the modern Cagliostro, who still, as Balsamo did of old, cozen the credulous for a *quid pro quo*, by inducing them to believe in the magic powers of philters, potions, and cures by faith. The trial court therefore, whether it assigned a reason for its action or not, ruled correctly in excluding this clap-trap from the consideration of the jury."¹⁰ The rules of evidence always insist upon the superiority of sworn over unsworn testimony;¹¹ a conclusion which recent experiments confirm.¹² There is skepticism of the evidence of infants¹³ and 'lunatics.'¹⁴ Distrust of leading questions prevails¹⁵ on sound psychological grounds.¹⁶ The importance of habit is partially envisaged.¹⁷ It is observed,

⁹ *Ill. L. Rev.*, 1928, 23, 172, 173.

¹⁰ 289 S. W. 920 (Mo. 1926).

¹¹ Wigmore, 'Evidence' (2d ed., 1923), Sec. 1816, saying that the theory of the oath is of divine origin.

¹² Poffenberger, 'Applied Psychology,' 1927.

¹³ *Gay v. Director Gen. of R.R.*, 79 N.H. 512, 111 Atl. 855 (1920).

¹⁴ *Ruocco v. Logiocco*, 104 Conn. 585, 134 Atl. 73 (1926), noted in *Yale L. J.*, 1927, 36, 423; Hutchins and Slesinger, *op. cit.*, 'Competency of Witnesses,' *supra* note 8.

¹⁵ *Steer v. Little*, 44 N. H. 613 (1863). Cf. *Yale L. J.*, 1928, 37, 387.

¹⁶ Whipple, 'Psychology of Observation and Report,' *PSYCHOL. BULL.*, 1918, 15, 217.

¹⁷ *State v. Manchester and L. R.R.*, 52 N.H. 528 (1873); *Carr v. West End St. Ry.*, 163 Mass. 360, 40 N.E. 185 (1895) (habits for soberness not allowed to be powers to select evidence of intoxication); *Pennsylvania Ry. v. Books*, 57 Pa. 339, 98 Am.

too, that a memorandum made at the time of the event it describes is probably more accurate than one made years after.¹⁸ The insistence on speed in admitting the class of testimony known as spontaneous exclamations is in part corroborated by the evidence of psychology.¹⁹ These exclamations are admissible if made within a brief period after the speaker has received a severe physical shock and inadmissible if the trial judge rules that time for fabrication has intervened between the shock and the exclamation.²⁰

Modern psychology gives some support to the attitude of the courts in these particulars. Where it is critical it is critical of measurements that are new, even to psychology. Thus the law takes little cognizance of the curve of forgetting when dealing with a memorandum offered by a witness willing to swear to its accuracy though recalling nothing of its contents.²¹ Many courts will exclude such a writing if made more than a week after the transaction described in it.²² Others tend to draw the line at a longer period.²³ All seem to assume that forgetting goes on at a constant rate, so that a memorandum made six weeks after an event is necessarily half again as inaccurate as one made only a month later. The courts fail to differentiate degrees of learning, or to inquire into the complexity of what was set down. If it was recorded at or near the time it went on,

Dec. 229 (1868) (holding intemperate habits admissible to prove intoxication at time of accident); *Southern K. R.R. v. Robbins*, 43 Kan. 145, 23 Pac. 113 (1890); *Petro v. Hines*, 299 Ill. 236, 132 N.E. 462 (1921), Annotated in 18 A.L.R. 1106, 1109 (1922); *Ill. L. R.*, 1922, 16, 628; *Mich. L. R.*, 1916, 14, 411; *U. of Pa. L. Rev.*, 1916, 64, 403; *Yale L. J.*, 1920, 30, 195; Wigmore, *op. cit.*, supra note 11, Sec. 92ff.

¹⁸ *Maxwell's Ex'r. v. Wilkinson*, 113 U.S. 656, 5 Sup. Ct. 691 (1885).

¹⁹ Hutchins and Slesinger, *op. cit.*, 'Spontaneous Exclamations,' supra note 8; Münsterberg, *op. cit.*, 1918, supra note 6; Gorphe, 'La Critique du Temoignage,' 1927.

²⁰ *Chawkey v. Wabash Ry.*, 297 S.W. (Mo. 1927); *Comm. v. Puntario*, 271 Pa. 501, 115 at 831 (1922), noted in *U. of Pa. L. Rev.*, 1922, 70, 332; *Mich. L. Rev.*, 1926, 25, 277; *Krooner v. City of Waterbury*, 136 at 93 (Conn. 1927); *Eastman v. B. & M. Ry.*, 165 Mass. 342, 43 N.E. 115 (1896); *Guild v. Pringle*, 130 Fed. 419 (C.C.A. 4th, 1904). Cf. *U. of Pa. L. Rev.*, 1915, 64, 99, 851.

²¹ Hutchins and Slesinger, *op. cit.*, 'Memory,' supra note 8.

²² *O'Neale v. Walton*, 1 Rich. 234 (S.C. 1844); *Anderson v. Walley*, 3 C. & K. 54 (1852); *Martin v. Good*, 14 Md. 398 (1859).

²³ *Insurance Co. v. Evans*, 15 Md. 54 (1854).

it will be admitted in evidence, on the assumption that all memoranda set down within that brief period are equally valuable.²⁴ Again, in dealing with spontaneous exclamations, though the courts are clearly headed in the right direction in holding that statements made under sudden shock will not often be intentional fabrications, they do not observe that emotion at the same time so impairs objective accuracy that the report of an excited individual is not likely to be worthy of much credit.²⁵ An injured person in great pain cannot perhaps deliberately plan a false statement; but he is unlikely to give an accurate version of what took place. This the courts are unwilling to concede. They will exclude the statements of a disinterested observer made at the time of an event precisely because he is not excited and can therefore lie readily.²⁶ And in considering the time that must elapse from a blow on the head to a lie the courts fail to take any notice of the necessity of measuring the interval nicely. They will rule that a statement was made before the speaker had an opportunity to fabricate if he uttered it ten minutes after a severe shock or on recovering consciousness, whereas if he uttered it fifteen minutes after, it may be excluded as a mere narrative of past events.²⁷ The psychological experiments on reaction time in lying have had no effect on the law.

Thus the law proceeds on a common sense art of behavior, which fails to hold its ground in the face of scientific data. At times the generalizations seem to be on the right track, but the concrete application in specific instances, and in some large classes of specific instances, is demonstrably faulty. At other times even the generalization is wide of

²⁴ *Wishek v. U. S. Fidelity Guaranty Co.*, 213 N.W. 488 (N.D. 1927); *Kolher v. Frankenthal*, 159 Ill. App. 382 (1911); *Norwalk v. Ireland*, 68 Conn. 1, 35 Atl. 804 (1896); *Wigmore, op. cit.*, supra note 11, sec. 745.

²⁵ *Hutchins and Slesinger, op. cit.*, 'Spontaneous Exclamations,' supra note 8.

²⁶ *Louisville Ry. v. Johnson*, 131 Ky. 277, 115 S.W. 207 (1909); *Chicago and E. Ry. v. Cunningham*, 24 Ind. App. 192, 53 N.E. 1026 (1899); *Baker v. State*, 45 Tex. Cr. App. 392, 77 S.W. 618 (1903); *Gauin v. Ryder*, 38 R.I. 31, 94 at 670 (1915); *Marlatt v. Erie Ry.*, 154 App. Div. 388, 139 N.Y. Supp. 771 (4th Dept. 1913); *Norfolk & W. Ry. v. Gesswine*, 144 Fed. 5 (C.C.A. 6th 1906). Contra: *Emmens v. Lehigh Valley Ry.*, 223 Fed. 810 (D.N. Dak. 1915).

²⁷ *Denver v. Atchison and T.S.F. Ry.*, 150 Pac. 562 (1915). Cf. *Yale L. J.*, 1928, 37, 524.

the mark. For instance, a habit of doing or not doing an act is generally inadmissible to show that a particular act was or was not done at a particular time. Thus in a well-known New York case²⁸ the Court of Appeals reversed the trial court for allowing evidence in a negligence action that the person injured habitually stopped, looked, and listened when crossing tracks. The reason for this is partly psychological and partly practical. Many courts say that what a man did at one time under certain circumstances will not show at all what he did at another time under similar circumstances.²⁹ Further, they say, the introduction of evidence of habit is likely to lead to disputes as to each occasion when the man crossed the tracks, one side arguing that he always stopped, looked, and listened, and the other that he sometimes did not, with resultant confusion in the jury room as to what he actually did at the time of the accident in suit.³⁰ To the first objection the psychologists would certainly agree that if a man, every time he crossed the tracks for eight years, as in the New York case, exhibited due caution, a strong *prima facie* case was made out for the exhibition of the same caution at the time of the accident. The answer to the practical objection is that the regulation of a trial is committed generally in this country to the discretion of the trial judge.³¹ He can, for instance, check the interrogation of a witness as to his past misdeeds when counsel is seeking to discredit him, if in his judicial estimation the number of specific instances inquired about will confuse the jury.³² How many instances will confuse twelve men and women is clearly another psychological problem.

Nor are the courts entirely consistent in their psychological assumptions. Although habit is usually not allowed to evidence a given act, it is regarded as a great guarantee of accuracy in one instance. One may not show that a witness

²⁸ *Zucker v. Whitridge*, 205 N.Y. 50, 98 N.E. 209 (1912).

²⁹ *Ibid.*, *Noyes v. Boston and M. Ry.* 213 Mass. 9, 99 N.E. 457 (1912).

³⁰ *Cf. Wigmore op. cit.*, supra note 11, Sec. 97; *Zucker v. Whitridge*, supra note 28, saying it would raise too many collateral issues.

³¹ *Wigmore, op. cit.*, supra, note 11, sec. 16.

³² *Dungan v. State*, 135 Wis. 151, 115 N.W. 350 (1908); *Wawak v. State*, 279 S.W. 997 (Ark., 1926).

habitually tells the truth in order to show that he is telling the truth on the stand. But one may get in evidence his account books or business entries regularly made on the ground that the accuracy of these is guaranteed by his habit of making accurate records.³³ Outside of this case of business entries, habit is severely discounted throughout the law of evidence. Habitual criminality, for example, cannot be shown, even to rebut evidence of good character offered by a defendant in a criminal case.³⁴ Habits of assaulting others, of insulting women, or uttering libels cannot be offered to show that the accused committed the act with which he is now charged.³⁵ Similar previous or subsequent crimes are inadmissible to show guilt of a specific crime without the introduction of a *tertium quid*; intent, scheme, plan, knowledge, or design, or unless they are part of the crime charged.³⁶ The words employed to describe these exceptions to the rule suggest how vague their limits are. But in general the fact that a man has committed scores of similar crimes is held to be no proof whatever of the commission of that for which he is on trial. From the psychological standpoint this is excluding evidence of the most relevant and persuasive kind. The courts readily concede the importance of habit in chickens and dogs; but as they never tire of pointing out, men have free will, and can thus, when they wish, shake themselves loose from the past.

Instead of admitting evidence of habit or series of specific acts approximating a habit the law insists on something it

³³ *Smith v. Smith*, 163 N.Y. 168, 57 N.E. 300 (1900); *Lassone v. Boston and L.R.R.*, 66 N.H. 345, 24 Atl. 502 (1890); *Givens v. Pierson's Adm'r.*, 167 Ky. 574, 181 S.W. 324 (1916), Annotated (1917) Ann. Cas. 1917 C, 956, 961; noted in *Harv. L. R.*, 1916, 29, 863; *Yale L. J.*, 1927, 36, 1184; *Harv. L. Rev.*, 1920, 33, 982; *Harv. L. Rev.*, 1922, 35, 442; *Harv. L. Rev.*, 1916, 29, 863; *Mich. L. R.*, 1926, 24, 721; *Col. L. R.*, 1915, 13, 535; *Harv. L. Rev.*, 1924, 37, 1139; *Harv. L. R.*, 1905, 18, 52; *Mich. L. R.*, 1922, 20, 530.

³⁴ *King v. Fisher*, S.R. (1910) 1 K.B. 149 (1909); *Wigmore, op. cit.*, supra note 11, sec. 57. Cf. *Woods v. People*, 55 N.Y. 515 (1874); *People v. Rodawald*, 177 N.Y. 404, 70 N.E. 1 (1904).

³⁵ *Butler v. State*, 162 Ala. 71, 50 So. 400 (1909); 2 Jones, 'Commentaries on Evidence' (2d ed., 1926), sec. 623.

³⁶ *People v. Rogers*, 154 N.E. 909 (Ill. 1926), noted in *Yale L. J.*, 1927, 36, 879; *Minn. L. Rev.*, 1927, 11, 666; *Hope v. People*, 83 N.Y. 418 (1881); *Offler v. State*, 4 Boyce 62, 85 Atl. 731 (Del. 1913), noted in *Harv. L. R.*, 1913, 26, 656; Jones, *op. cit.*, supra, note 35.

calls 'character' testimony.³⁷ By character it does not mean habit or habits; it does not mean disposition.³⁸ It means reputation, the common speech of people.³⁹ A defendant in a criminal case shows his good character not by pointing to his deeds of charity and nobility, but by introducing witnesses who swear that his reputation for not stealing is good in his home town. You prove the lying tendencies of your opponent's witnesses not by retailing the number of times they have committed perjury, but by bringing in their neighbors to swear that people say they lie. Should one of the neighbors admit that he is giving his personal estimate of the witness's mendacity, his testimony will straightway be stricken from the record;⁴⁰ reputation only is admissible, on the ground that what has so often been repeated would have been corrected had it been wrong, and that anything else will confuse the jury.⁴¹

In some of the cases mentioned the law has to a greater or less degree taken a general attitude which finds some support in psychology. In other cases where psychology has something definite to offer, the courts have repelled the introduction of its findings. In only two or three cases has a psychological test been admitted over objection. In West Virginia testimony that the defendant is a moron is forbidden and on several recent occasions mental tests have been definitely excluded.⁴² The law prefers to rely on the discretion of the trial judge to determine the qualifications of a witness.⁴³ In practice this means that the judge will look at

³⁷ *Edgington v. U.S.*, 164 U.S. 361 (1896).

³⁸ See *Harv. L. Rev.*, 1911, 24, 312, distinguishing habit, character, and custom.

³⁹ Cf. *Kimmel v. Kimmel*, 3 Serg. & R. 336 (Penn. 1817); *Comm. v. Lawler*, 12 Allen 585 (Mass. 1886).

⁴⁰ *Reg. v. Rowton*, 10 Cox Cr. Cas. 25 (1865).

⁴¹ Wigmore, *op. cit.*, supra, note 11.

⁴² *State v. Wade*, 96 Conn. 238, 113 Atl. 458 (1921); *Clark v. State*, 156 N.E.; 219 (Ohio App. 1926). But see *State v. Schlaps*, 254 Pac. 858 (Mont. 1927); *Strand v. State*, 252 Pac. 1030 (Wyo. 1927); *Frye v. United States*, 293 Fed. 1013 (D.C. 1923), noted in *Yale L. J.*, 1924, 33, 771; *Harv. L. Rev.*, 1925, 37, 1138; *Col. L. R.*, 24, 429. *A. L. R.*, 1924, 34, 147. Cf. McCormick, 'Deception Tests and the Law of Evidence,' *Calif. L. Rev.*, 1927, 15, 484.

⁴³ *Wheeler v. United States*, 159 U.S. 523, 16 Sup. Ct. 93 (1895); *Regina v. Hill*, 5 Cox Cr. Cas. 259 (1851); *Mich. L. Rev.*, 1926, 24, 507; *Va. L. Rev.*, 1921, 7, 663; *Yale L. J.*, 1927, 36, 423.

him, ask him a few casual questions, and determine that he is or is not a person who can tell a story which will be helpful to the jury. Such a cursory inspection by men usually without any scientific training can hardly be preferred to the carefully prepared and standardized tests which are now administered to students by many conservative law schools. Here is a case where the prediction of the great authority on evidence, Professor Wigmore, that when the psychologists have anything to offer the law will be ready for them, seems to have been slow in reaching fulfillment.

Of course the fact is that in many departments of the law of evidence the psychologists at present have little or nothing to offer. As Professor Thayer showed long ago the rules of evidence developed because of the jury system.⁴⁴ Courts and lawyers took the rather excusable view that if they were to be subjected to the decisions of twelve men of average ignorance they should have some form of protection against their passion, prejudice, and stupidity. Consequently the real problem in evidence is not, are statements made under given circumstances true?; but, are these statements such that the jury can tell whether they are true or not? The rules are constructed to keep from the jury material which they cannot evaluate, such as hearsay, or which would confuse them by the multiplication of issues, as would the introduction of witness after witness to prove and deny specific acts of misconduct in the lives of other witnesses. Thus Professor Thayer said, "To those who look upon the law of evidence as a system elaborated for the mere discovery of truth, and judge it by its logical adaptation to that end, it seems in this part of it peculiarly absurd. To those who take the more intelligent view, that it is not merely a piece of machinery for truth-seeking, but one subsidiary to the distribution of justice, worked through the agency of an untrained tribunal, and shaped to the uses of that tribunal by judges who were very distrustful of its capacity and fairness, it may present a very different aspect."⁴⁵

⁴⁴ Thayer, 'A Preliminary Treatise on Evidence at Common Law,' 1898, p. 47ff.

⁴⁵ Thayer, 'Legal Essays,' 1908, 265.

The trouble is that the characteristics of the jury are assumed. It is thought that they cannot evaluate hearsay, and that a multitude of specific acts of misconduct would confuse them. Psychologists have overlooked this important feature of court room procedure. Experimentation has shown that a statement made under the influence of emotion is likely to be inaccurate.⁴⁶ It has not shown that a jury would be incapable of realizing its inaccuracy. Münsterberg attempted to prove that the law allowed certain testimony which in a vacuum seemed rather peculiar. But he disregarded the fact that we are not concerned with truth or falsehood in the abstract, but with the ability of the jury to detect truth or falsehood. The careful investigators who followed Münsterberg continue to disregard what every student of law recognizes as the crux of the situation.⁴⁷

Another problem in evidence which is fundamental and on which psychology affords little aid is that of veracity. The law has its empirically built up psychology as to what facts should go to the jury to aid them in determining whether a witness or a declarant who is absent is likely to tell the truth. Here on cross-examination under the general American rule any degrading act of the witness may be brought to light in order to affect his credibility if the trial judge will allow it.⁴⁸ In the Sacco-Vanzetti case,⁴⁹ a defendant on trial for murder in a hold-up was asked about his love of money; his love for this country; his information relative to the charitable activities of Harvard; his knowledge of the number of school children in Boston; his subscription to anarchist papers; the coincidence of his views with those of a named anarchist; his avoidance of conscription; and whether he was a man who would tell the jury that the United States was a disappointment to him. The Supreme Court of Massachusetts said: "These questions, as well as the questions relative to the possible effect on his wife of his possible arrest and deportation for

⁴⁶ Hutchins and Slesinger, *op. cit.*, 'Spontaneous Exclamations,' *supra* note 8.

⁴⁷ Marston, Larsen, Whipple in this country, to name a few only of those who have studied the psychology of testimony.

⁴⁸ Hutchins, 'Cross-examination to Impeach,' *Yale L. J.*, 1927, 36, 384.

⁴⁹ 151 N.E. at 856.

participation in movements inimical to the government, were within the rule that a witness may be cross-examined in the discretion of the trial judge to test his accuracy, veracity or credibility, or to shake his credit by injuring his character, and for this purpose his way of life, his associations, his habits, his prejudices, his physical defects and infirmities, his mental idiosyncrasies, if they affect his capacity, means of knowledge, powers of discernment, memory and description may all be relevant." The court is aware of the fact that all of these matters are not relevant to veracity; it is frankly as much concerned with credibility as absolute truth. The question it puts is, what sort of individual history is capable of shaking one's faith in one's fellow man? Here the psychologist has an investigation that can profitably be pursued both from the standpoint of the witness and that of the jury. On the former some light can be thrown at present; the latter remains to be solved. Various jurisdictions have suggestions to offer that the psychologist can study with profit. Sometimes violation of the prohibition law will indicate that a man has the earmarks of a liar;⁵⁰ at other times only an infamous crime has that effect.⁵¹ The evolution of intelligent rules awaits the results of psychological study.

As was noted above, hearsay evidence is inadmissible because it is thought that the jury will be unable to appraise it. But this rule has numerous exceptions. In building up these exceptions, the courts have found it necessary to have for each one of them a guarantee of trustworthiness.⁵² If a statement is to be received in evidence although the speaker is not on hand to be sworn and cross-examined, some substitute for cross-examination and the oath must be discovered. The dying declaration of a person whose death is the subject of the charge is admissible in criminal cases. The guarantee of trustworthiness is found in the fact that the declarant is about to meet his Maker.⁵³ In one case where he decorated

⁵⁰ *Smith v. United States*, 10 Fed. (2) 787 (C.C.A. 9th 1926).

⁵¹ *Cf. Gen. St. Conn.* 1918, sec. 5705; *Hutchins, op. cit.*, supra note 48.

⁵² *Wigmore, op. cit.*, supra note 11, sec. 1422.

⁵³ *Queen v. Jenkins*, L.R. 1 Cr. Cas. 187 (C. Cr. App. 1869); *McKee v. State* 154 N.E. 372 (Ind. 1926), noted in *Yale L. J.*, 1927, 36, 880; *Mich. L. Rev.*, 1922, 671.

his last words with profane language, the court refused to admit them on the ground that in such a man the sense of impending death could not induce truthful utterance.⁵⁴ But what do we know about the sense of impending death? Does it actually lead us to make our peace with God and man, or does it lead us to accuse whichever of our enemies we most dearly yearn to see upon the gallows? Further, when does one have the sense of impending death? Usually the courts will concede it to a person who says he has it.⁵⁵ Sometimes they will grant that a person very severely wounded must realize that he is going to die.⁵⁶ Psychological investigation here would be difficult, but not impossible; and the results would throw light on other problems than legal procedure.

Many of the other exceptions to the hearsay rule rest on the idea of self-interest, a concept beloved in the law. A confession is probably true because it is against interest.⁵⁷ Similarly the declaration of a deceased person that he did not own a certain piece of land will be admitted against those claiming ownership because he would not have made it if it had not been true.⁵⁸ In admitting regular business entries the courts have found two guarantees. One is that referred to earlier, habit; and the other is the self-interest of a man making up a set of books.⁵⁹ It would be difficult for him to fabricate; it would be like cheating at solitaire. It is to his interest to keep accurate books in order to see that his business affairs are well managed. This notion of self-interest is of the standard utilitarian brand; but the legal doctrine was antecedent to that of utilitarianism. The psychology from which it derives its support is now outworn; but the particular situation remains to be studied in detail. Aside from the general studies on habit, indicating that a habit may persist even when it is against its owner's interest

⁵⁴ *Tracey v. People*, 97 Ill. 101 (1880).

⁵⁵ *Nolle v. Com.*, 212 Ky. 668, 279 S.W. 1073 (1925). Cf. *Yale L. J.*, 1927, 36, 880.

⁵⁶ *People v. Ybarra*, 17 Calif. 166 (1860); *Territory v. Eagle*, 15 N.M. 609, 110 Pac. 862 (1910). Cf. *Calif. L. Rev.*, 1925, 13, 253.

⁵⁷ *State v. Dunn*, 211 N.W. 850 (Iowa, 1927); *People v. Heide*, 302 Ill. 624, 135 N.E. 77 (1922); *Yale L. J.*, 1921, 30, 418. Cf. *Yale L. J.*, 1924, 33, 783.

⁵⁸ *Vrooman v. King*, 36 N.Y. 477 (1864); *Harv. L. Rev.*, 1910, 23, 397.

⁵⁹ *Lassone v. Boston & L. Ry.*, *Supra* note 33. Cf. *Harv. L. Rev.*, 1926, 39, 863.

to continue it, little has been done by psychology in studying the validity of the specific rules of evidence which rest upon the self-interest foundation. Do men generally say that they do not own property if they do own it? Do men confess crimes when they are not guilty of them? Do people fabricate business records though the casual observer would think that they were complicating life by doing so?

If we take special aspects of the general rules on confessions and declarations against interest the case is just as bad. The courts hold that though a man will not lie against his proprietary or pecuniary interest, he may lie if his statement, instead of costing him money, would merely send him to the electric chair. Thus in a case decided not so long ago by the United States Supreme Court a man now dead said that he had committed a certain murder.⁶⁰ But the court held that such a statement was inadmissible. Only declarations affecting a man's pocket book, not his life, can come in, and this is law in forty-seven American jurisdictions. Common sense will not support such a distinction. Will psychology? A confession is inadmissible if it was made to a person in authority as a result of a hope of reward or fear of punishment.⁶¹ In the old days, "You had better tell the truth" was regarded as a sufficient inducement to vitiate the confession.⁶² Now the third degree or something like it is generally required.⁶³ Here we need to know what kind of experience will produce a false statement in order to secure a cessation of the experience or prevention of its repetition.

These examples, taken from one field of law only, indicate the vast number of legal problems still unsolved in any satisfactory manner. Many of them are fundamentally psychological problems, and would have been recognized as

⁶⁰ *Donnelly v. United States*, 228 U.S. 243, 33 Sup. Ct. 449 Ann. Cas. (1913 E.) 710, 723, criticized in *Yale L. J.*, 1927, 36, 119. But see *Hines v. Com.* 117 S.E. 843 (Va., 1923), noted in *Va. L. Rev.*, 1924, 10, 83.

⁶¹ *State v. White*, 292 S.W. 411 (Mo. 1927); *Rex v. Jones Russ. & Ry.*, 152 (C. Cr. App. 1809).

⁶² Cf. *Regina v. Moore*, 2 Den. C.C. 522 (1852).

⁶³ *Wan v. U.S.* 41 Sup. Ct. 1 (1924), noted in (1924) 10 Cor. L. Q. 225; *Regina v. Baldry*, 2 Den. C.C. 430 (1852); *Ammons v. State*, 80 Miss. 592, 32 So. 9 (1902); *Yale L. J.*, 1921, 30, 418.

such long ago had psychology been interested in human behavior, instead of in epistemology and cosmology. In fact it is conceivable that the whole science might have grown out of the art of law, instead of philosophy. In that case, human behavior would have been of primary rather than secondary importance.

There is the great gain possible to psychology by a close contact with the law. Advertising, vocational guidance, education have contributed their special interests, and even the theoretical basis of psychology has been improved thereby. The legal field is vaster and more general than any of these. In one way or another it touches every department of human life, obviously or subtly. The court room is the most spectacular, but least important part of the time honored discipline. The growing complexity of civilization means the increasing ramifications of institutions of regulation.

It is important for psychology to step in at this instant in order to prevent the law's appropriating and misusing its language as medicine did. The legal mind is already impatiently attacking the subject conceptually, and with a limited experience. Books are appearing and articles in legal journals, which are amazing in the small amount of light they throw on legal problems.⁶⁴ Stimulus, response, introspection, behaviorism, are bandied about the classroom by law teachers who do not know the meaning of the terms. A few years of it and legal psychology will be entirely discredited and another century will have to pass before the two ways of studying one problem can be brought together again. If, on the other hand, legal psychology grows up as a joint product, its importance is immeasurable. It is safe to say that in a decade it would be able to throw as much light on the all-important subject of the correlation of traits in the normal human animal, as medical psychology, through a barrage of muddy concepts, has on the traits of the abnormal.

⁶⁴ Brown's 'Legal Psychology,' 1927, is one depressing example of this tendency.

THE LEARNING PROCESS: A CRITICISM AND A THEORY

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An examination of the various theories of learning shows that little or no positive progress has been made in explaining the elimination of errors. It has been pretty well established that some of the older theories are inadequate, but the newer ones also fail to explain the selective process. A brief survey of the current views will show how completely they have failed to satisfy the requirements of the problem.

Perhaps the severest criticism of the pleasure-pain theory is its implication of a rather high degree of mental activity in the lower animals. It requires a belief that the impulse to enter a blind alley produces in the rat a condition closely analogous to pain and that when he passes the alley he has a joyous feeling. The rat must also associate that blind alley with the pain of previous failures and he must remember that it was one of the causes of the failure. This puts altogether too much strain on our anthropomorphic credulity. Further, each element of the series must be influenced by the agreeable or disagreeable contribution which it makes to the final result, namely, success or failure in attaining the goal.

Recency and frequency have also been offered as an explanation. But one or more errors may be more frequent than the successful act, and the difference in recency is often so slight as to be of doubtful influence. Besides, Peterson found¹ that while recency and frequency may explain how rats reach the food box, they do not explain the elimination of useless acts or the use of short cuts. In a later study² he also showed that these same factors—recency and frequency—

¹ *J. Animal Behav.*, 1917, 7, p. 338.

² *J. EXPER. PSYCHOL.*, 1922, 5, p. 270.

may be negative in their effects, "tending to fix erroneous responses rather than the correct ones." Kuo likewise observed, in his investigation,³ that "many rats learned to select a correct path not only *not* because of recency or frequency, or both, but in spite of them."

Other explanations have been offered and perhaps some of them had better be mentioned together with the names of the men who have proposed them. The satisfyingness theory of Thorndike⁴ is not a little suggestive of the older and discredited pleasure-pain notion. The confirmation and inhibition theory of Hobhouse⁵ and the congruity and incongruity hypothesis of Holmes⁶ also show signs of pleasure and pain as the selecting and eliminating force.

Referring to the chick pecking at some object, Hobhouse says: "This reaction has a certain result . . . and in the future the same stimulus evokes a modified reaction. . . . The 'result'—the tasting or swallowing—may be to *confirm* the original mode of reaction, so that in one instance that sort of object is in future preferred for pecking at and swallowing to others. . . . Or it may be to prevent or *inhibit* the reaction, as in the case of the orange-peel or cinnabar larvæ." In human experience, "it is in such simple cases as those described, a feeling, and if its action is *confirmatory* of the reaction which caused it, it is a pleasant feeling; if inhibitory, a painful feeling."⁷

Holmes, in turn, in justification of his congruity and incongruity theory, says: "What it is feasible to attempt to explain is the way certain responses tend to be repeated and others tend to be inhibited. And this can be explained with some plausibility as due to the congruity or incongruity of the reaction which comes to be associated. . . . The irritation set up by the [bad tasting] caterpillar in the chick's mouth evokes movements of withdrawal or ejection."⁸ But so far

³ *J. Comp. Psychol.*, 1922, 2, p. 17.

⁴ 'Animal Intelligence.'

⁵ 'Mind in Evolution.'

⁶ 'Studies in Animal Behavior.'

⁷ 'Mind in Evolution,' pp. 88-89.

⁸ *Op. cit.*, p. 135.

as Holmes describes the nature of this irritation one must assume it to create an unpleasant feeling. Further, the theories of both Hobhouse and Holmes assume what is to be explained, namely, selection and elimination. Then, having assumed these acts, they name them.

Naturally, all acts in a successful series are congruous, and each successful act tends to confirm the preceding successful ones if they are not too far back in the series. How the successful ones are selected for confirmation, however, is not stated. The question involved in the learning process is not the way in which correct acts are fixed. Rather it is, why are the right ones selected and the wrong ones eliminated?

The words satisfying or annoying, confirming and inhibiting, congruous and incongruous merely describe selected acts as satisfying, as congruous, or, again, as confirmed. But, unless we fall back on the pleasure-pain hypothesis we are left wholly ignorant as to why certain acts are selected and others eliminated.

Other theories also have been proposed. Let us briefly name them, together with the books or periodicals in which they have been argued. Woodworth⁹ speaks especially of the 'drive,' Perry¹⁰ of the 'higher propensity,' Tolman¹¹ of the 'determining adjustment,' Peterson¹² of the 'completeness of response,' and Carr¹³ of the 'sensory consequences,' or 'sensory intensity' of successful and unsuccessful acts.

Woodworth's 'drive' every psychologist admits, but there is no selective or eliminating power in the metabolic changes, internal secretions, etc., which promote this drive. It undoubtedly puts the organism into a state of readiness, but it is difficult to see how it acts as a determining force, exciting subordinate reactions to bring about the consummation of the end.

Perry's 'higher propensity' and Tolman's 'determining

⁹ 'Dynamic Psychology,' and 'Psychology.'

¹⁰ *PSYCHOL. REV.*, 1918, 25, p. 1.

¹¹ *PSYCHOL. REV.*, 1920, 27, p. 217.

¹² *PSYCHOL. REV.*, 1916, 23, p. 153.

¹³ *PSYCHOL. REV.*, 1914, 21, p. 157.

adjustment,' again, beg the question. They assume a selective tendency and then name it. The vital question, however, is the process of selection and elimination, but of this these theories tell us nothing.

In explanation of his completeness of response theory, Peterson says that after a rat has entered a blind alley and his progress has been checked, "certain elements of the general response are tending to drain into other alleys that may recently have been passed, thus partially dividing the animal's activities."¹⁴ But, assuming that the rat has passed a blind alley as well as the true path, this does not help us to understand why the draining process drains into the true path the next time instead of into the adjacent alley which the animal also passed in the previous test. Further, the completeness of response theory does not give us the slightest help in understanding why animals prefer short cuts to the longer path, a preference which has been demonstrated.

The sensory consequences or sensory intensity theory of Carr is Thorndike's satisfyingness and annoyingness theory under a new name. Thorndike did not limit his explanation to the affective results. Comparison of the following statements, one from each of these two investigators, will show the remarkable similarity of the two points of view.

"To say that successful means 'unimpeded' or 'unthwarted,' or 'uninterfered with'" Thorndike says, "tells us fairly well what *movements* will be satisfying, since for a movement to be impeded is for it to fail as a movement."¹⁵ And Carr, in partial interpretation of his own theory, tells us that "the blinds check, thwart, and suppress activity more than does the true path while the latter encourages and facilitates activity more than does a blind alley."¹⁶

Again, the completeness of response hypothesis of Peterson, and Carr's sensory consequences or sensory intensity theory are descriptive rather than explanatory. When a series is finished there is, of course, completeness of response, and it is a truism that every act, successful or unsuccessful,

¹⁴ *Op. cit.*, p. 155.

¹⁵ 'Educational Psychology,' Vol. 1, p. 125.

¹⁶ *PSYCHOL. REV.*, 1914, 21, p. 162.

produces sensory consequences, but we still remain unenlightened about the explanation of selection and elimination.

The problem cannot be solved by vague words. Completeness of response? Any learning series is 'complete' regardless of the number of errors. 'Completeness' can mean nothing more than that a series of acts—any series—has been finished. To define completeness of response as an errorless run is to say that an errorless run is errorless. True, but fruitless. Nothing new is predicated. The problem remains untouched. What gives dominance to one impulse—the right one—over another which is wrong?

Sensory intensity, or sensory consequences? Certainly. But why is the intensity or why are the consequences of passing a blind alley at the beginning of a dozen possible turns more controlling than the intensity of entering? What makes the right neural impulse leave its consequences and the wrong one fail to do so? Clearly, pleasantness and unpleasantness. But more than that, it is not pleasure in passing the blind alley. It is joy deferred, pleasure at the end of the performance. Exit! Food, to which passing the blind alley at the beginning of the series must be attached as a contributing factor. What makes the connection? What fixes the neural pattern that functions throughout the series to success? Pleasure that runs its connecting affective thread through the true path and guides the rat to the happiness that awaits him if he but understands the guiding principle.

But does he? The assumption requires too much credulity, too much confidence in the 'mind' of the rat. It is too anthropomorphic even if we admit that this is the explanation of a man's success in a stylus maze. But this is an admission that few psychologists, if any, will make. The evidence is against it.

In all animals a neural tension is produced by stimulation of receptive centers through a sense organ. This neural tension, or subexcitation, forms functionally operative neural patterns corresponding to the objective patterns to which the animal reacts, and these neural patterns or dispositions are

retained. Let us now see whether man, at times, passes through learning processes similar in all essential respects to those of the lower animals. As the process in human beings is often wholly unconscious, anthropomorphic objections cannot be raised, provided consciousness, as we understand it in man, plays no necessary part in the learning activity of our illustration.

We may assume that a man starts from his hotel to find a certain house in a strange city. From the visual stimulation of a map he takes a certain direction. He is reacting merely to nervous tensions—subexcitations—laid down by the map. In time he has a neuro-kinæsthetic disturbance which indicates that he has taken too many steps. The explanation of this neural tension we need not at present ask. That it occurs without the individual being able to isolate and name any causal factors is sufficient. Kinæsthetic and motor sensory experiences have also been found to play an important rôle in the formation of maze habits in rats. Apparently, these animals are guided in large part by tactual and muscle sense. Further, human subjects have reported a 'feeling' of neural tension, or subexcitation, when learning the stylus maze. This tension seems to be a physiological resistance to the wrong reaction. Our stranger has the same physiological disturbance. He does not picture any particular street which he should have taken. It is merely a physiological subexcitation and, consequently, he turns back, comes to a street and takes it, not because of sensory intensity or selective drive, or for any other reason than that his kinæsthetic sensations had been too long continued without the variation produced by a turn in the path. The physiological tension is now relieved and the same process of subexcitation and release of tensions is repeated as the man threads his way through the maze of streets until he finally reaches his goal. Thus far the writer thinks that he has resisted the temptation to commit an anthropomorphic crime.

The next day our stranger again starts out to traverse the same course to the same house. But, being devoid of mental images, he is dependent upon the neural effect of the

preceding trip. Consequently, like the rats, he makes mistakes. He passes a street into which he should have turned, but soon the visual and kinæsthetic impressions again produce a physiological tension and, as does the rat, he stops, looks (or 'feels') around, turns and retraces his steps to the street which he should have taken. He takes the branching street not because he knows that it is right but because it is available and his kinæsthetic sensations have been too long continued without a change. The hesitation and final turning were caused by neural subexcitations which are relieved the moment he takes the new path. Those who have wandered through mountain trails, as the writer has, are quite familiar with this ill-defined neural tension which seems to be produced, in part, by kinæsthetic sensations and, in a measure, by the whole situation. Particular details may be unimportant because they are unrecognized except as contributory factors to the situation as a whole.

Now let us suppose our stranger to be suddenly deposited half way to his goal. Nothing 'feels' quite right because there have been no preceding neural impulses to direct his movements. His kinæsthetic coördinations are useless since he has not traversed the first part of the course. He walks up and down the street for a few moments, then, suddenly, the visual stimulation of a building or group of buildings excites a neural pattern which had been active during his previous trip and he starts off. He has gotten his bearings.

The chief difference between our stranger and rats is the source of their cues. Man, when finding his way, is conspicuously dependent upon visual signs, while rats, white rats at least, seem to be guided in large part by the tactual and muscle senses. They have been observed to start into a blind alley, then turn and run back, taking the right path. The indications are that when these rats turned into the blind alley the conflict between the kinæsthetic sensations of turning and the older neural pattern of continuing in the straight path already in process of formation, caused a physiological tension—a subexcitation—which was relieved when they returned to the true path. This neural disturbance

can also be matched in man in situations different from city streets and mountain trails. One accustomed to brush the teeth, shave, and do other morning duties in a certain order, sometimes, for good reasons, varies the series, and invariably in such a case one experiences physiological friction.

We have tried to describe the actions of a man under conditions similar to those of the maze, and, so far as outward signs go, his behavior is strikingly like that of a rat in his strange maze-city with its numerous streets and blind alleys. We have also endeavored to give this account in purely physiological terms, yet, in doing this, we have not done violence to any of the beliefs of psychologists of the so-called orthodox school.

This physiological description is true to human experience because a stranger in the conditions described is conscious of little except his uncertainty. He is lost, and actually gropes his way along without any purpose more definite than to reach his goal. His cues are largely visual, though kinæsthetic sensations disclose themselves in a vague 'feeling' that he has walked too far or not far enough for the correct turn. Let us now see whether we can continue the description in such a way as to help us to understand the rat's elimination of errors.

The buildings and other objects which the stranger sees are grouped in a certain configuration. He may or may not act with reference to a definite object. In any case the arrangement of buildings, sidewalk objects and streets form an objective visual pattern to which the man reacts and the kinæsthetic coördinations also create, or correspond to, a motor pattern. Assuming, as is sometimes the case, that the names of the streets are not retained, guidance during the first trip is largely muscular. The man is to go a certain kinæsthetic distance, then turn to the right, and farther on he should take a left turn. It is not right and left as such but kinæsthetic impulses in one direction or the other. Let us continue to avoid the use of images, since many men seem not to have them and rats probably never do. Looking at the map or hearing a verbal description by a friend has

put the neurones in a state of preparedness. Vague neural patterns have been started to the extent at least of nervous tensions in some centers and a readiness to integrate certain neurones into functionally active groups as the stranger finds his way by means of the objective visual and motor patterns which he senses. Further, positive and negative conditioning reflexes are continually in process of formation.

Notice, however, that, in the beginning, the man's sole guide is ill-defined nervous tensions: so much time, or, if you please, a certain quantity of muscular activity, then a right turn, and so on to the end. On the second trip there is more definiteness to the nervous tensions. Too much muscular activity without a turn means stop and retrace one's steps. The relative strength of kinæsthetic sensations takes care of this without the intervention of consciousness. The correct neural patterns have partially taken form and the nervous equilibrium is disturbed if they are not allowed to run their serial course with a certain expenditure of energy.

To be sure, other factors probably play a larger part in man's selections and eliminations than in those of the rat. We emphasize the visual element in human learning because we can isolate it and describe it as we cannot do with our kinæsthetic data. Rats, again, cannot consult maps, and they cannot be instructed through the ear about the true path. Consequently, they find the correct 'streets' at first by chance. But these animals have one great advantage over man, if, as seems to be the case, they are more sensitive to tactual and kinæsthetic sensations. The distance run plays a more conspicuous part in their selection and elimination of paths, though the distance passed over, perhaps even the number of steps taken, are not without influence upon a man in a strange city or on a mountain trail.

We find, then, that if we ignore consciousness in the case of a man who is trying to find his way among the streets of a strange city, a neural tension is 'felt' which seems to have its origin in a purely mechanical play between reaction systems. This same neural tension has been 'felt' and vaguely described by subjects working their way through

the stylus maze. It appears to be a physiological sensitiveness to the environment, a condition which would be of value in selecting the true path and in eliminating errors. This tension keeps nerve centers alert—a neural condition with which man is familiar—and, through the coördinated centers, it maintains a readiness for positive or inhibitory action. This tension has been noted by players of golf, tennis, basketball, and football, and in these games it occasionally changes a movement which has already been started. The fact that rats sometimes start into a blind alley, then turn and run back to the true path indicates that the same sort of neural tension is operating when they are running the maze. It is a balancing of conflicting impulses in the adjustment of which the sensing of the environment is the determining factor. But in this adaptation consciousness may play no part.

In reacting to the environment the adequacy of a stimulus depends, among other things, upon what has previously been laid down in the nervous system. Head has found that the "response from any one cortical point is not constant; it varies both in the nature of the movement evoked and in the part of the body thrown into action. The reaction depends not only on the site of the excitation, but also on the character of the events by which it has been preceded."¹⁷

One of Wiltbank's experiments is significant in this connection. He found¹⁸ that three rats having been started in one maze but not learning it, and then being transferred to another in which they remained until they had learned to run it without error, if again placed in the first maze ran it successfully at once, "although none of these rats had made an errorless run upon either of their two former trials." In this case we surely cannot speak of completeness of response in the first maze because there was no correct completion. Neither is the explanation the intensity or sensory consequences of the stimuli because the first maze was run successfully only after the sensory consequences of a wholly different maze. Something was left in the nervous system by the

¹⁷ 'Aphasia and Kindred Disorders of Speech,' Vol. 1, p. 432.

¹⁸ *PSYCHOL. REV.*, 1919, 26, p. 282.

training in the second maze, and that something consisted of neural dispositions and of tensions which were serviceable when the rats were returned to the first maze which they had not previously learned.

Sensory consequences are not the cause of selection and elimination in any other sense than that the stimulation of sense organs is the direct or indirect cause of everything that man or other animals do; and it should be emphasized that the indirect effect of sense excitation is often more fundamental than the direct, since, as we have shown above, the result on any given occasion depends upon former actions, the effects of which have been left as neural reaction patterns.

But a selective interplay of neural impulses is also occurring and the outcome is determined in some way, as yet unknown, by the dispositions which have already been laid down in the nervous system of the animal—after chance has given him his first success—and by the central tensions which reveal themselves in alertness to react predominantly or exclusively to certain situations.

This theory of subexcitation as the directive force seems inescapable. Children learning to read by the sentence method, instead of with the alphabet, illustrate it in one type of learning and muscular accomplishments in another. All feats of skill, indeed, such as golf or learning to plane a board, illustrate the effect of kinæsthetic guidance on the neural level. The isolation of the details of the process is the teasing problem.

This neural tension, or subexcitation theory, with the accompanying interplay of nervous impulses which work toward a definite goal, has many illustrations in man. Sometimes the end is attained but at other times the evidence for the subexcitation is uncertainty and hesitation. Let us again insist that we are not concerned with the conscious factors.

Not long ago the writer was in the same country place in which he had passed the previous summer. Wishing to see again a panorama which he had enjoyed the year before he started out to find the path among many branching trails.

Suddenly, he stopped, 'feeling' that he had lost his way. He looked around, but saw nothing that suggested right or wrong. The 'feeling' that he had erred, however, was persistent and finally he turned about, retraced his steps to the place where the trail branched, took the other path 'on a chance,' and it later proved to be correct. The 'feeling' so far as could be detected, was purely a neural disturbance. As nearly as the writer can describe his state 'things did not feel right,' but this 'feeling' was neural subexcitation in which kinæsthetic sensations—too many steps without a turn—were prominent. Was it then the result of sensory consequences? Only in the sense that all vague 'feelings' and 'premonitions' be so regarded; but in that case the statement is merely a truism. The only intelligible explanation of 'feelings' and premonitions is that they are the product of neural tensions caused by previous experiences which have not come into consciousness or, to go behind the superficial word 'experience,' by the 'set' that neurones acquire from the contact of the individual with his environment. But learning is only one phase of getting experience and, consequently, it has the same explanation.

Two men accompanying each other in searching for a trail which both traversed the preceding year will show the same neural disturbances. In each, unclear 'feelings' of rightness or wrongness—neural subexcitation—will arise at varying points in the trail, but neither the 'feelings,' nor the places where they occur will be the same for both men. Let us repeat that in all of our illustrations from human beings we are leaving conscious memory and images out of consideration. We are thinking only of those facilitations, resistances, and inhibitions which the lower animals have in common with man. We have found that when all conscious aids are ignored man has vague 'feelings'—restlessness, uneasiness—about being in the right or wrong path. These 'feelings' are in part the result of visual and in part, again, of muscular reactions, and they are so vague and indefinite as to baffle complete description. Usually they are just 'feelings' of rightness or wrongness which seem to have

their source in neural tensions caused, after the first trip over the route, by the effects of previous movements and actions, which have been laid down in the coördination centers, and in neural reaction patterns. Man is evidently sensitive to sensory phases of the environment without being able to name the factors to which he reacts.

This neural tension theory—subexcitation caused by the retention of the effect of reactions rather than the reactions themselves, and the formation of neural patterns by the activity of coördination centers—agrees quite well with certain other facts which have been observed. Objective guidance for example, does not advance the learning of the stylus maze with human subjects as might be expected were the explanation to be found in the completeness of response or in sensory consequences. Little or no tension is produced when movements are guided, and neural patterns hardly function. A similar illustration may be observed when one rides in an automobile but does not handle the steering wheel. Under these conditions, learning the streets is a slow process compared with the progress made under the stress and strain of errors; and the same fact is noticeable if a man follows mountain trails with a guide who knows the way. Negative conditioned reflexes are slow in forming; the cortex is unperturbed, and neural patterns function only to the extent to which disturbance and conflicts arise.

Since all attempts to explain learning from the sensory end of the process have failed, the question may well be raised whether investigators have not been working at the wrong end of the series. Should not the solution be sought in the interplay of central neural forces rather than primarily in sensory factors? The problem, let us repeat, is that of elimination and selection. What are the changes laid down in the nervous system by which one reaction pattern becomes influential in the play of neural activity?

The explanation of the learning process in rats, when it is finally discovered, must also explain unconscious cerebration in man because in each case neural forces work toward the solution of a problematic situation. In both instances elimi-

nation and selection are revealed in the interaction of neural impulses for the final attainment of the goal; and in unconscious cerebration the rôle of sensory factors is often so indirect as to escape detection.

In man, unconscious cerebration directed toward a goal has been established and, consequently, the same process may be assumed in rats. This fact seems to have been overlooked by investigators of animal learning. In our efforts to avoid anthropomorphism, have we not oversimplified the problem by trying to find a single definite sensory factor that directs the learning process in the lower animals? The writer believes this to be the case and that the explanation must be sought in the central tensions, or subexcitation, that are produced by problematic situations in which an animal, be he man or rat, is struggling to attain a goal.

The emphasis on consciousness and conscious memory in human beings at first seriously disturbed our understanding of the learning process. Then, later, the determination not to be anthropomorphic caused investigators to overlook the similarity between the learning process in rats and unconscious cerebration in man. Until comparatively lately belief in unconscious processes as the core of memory and the basis of experience was too aberrant to be respectable. Such notions might be surreptitiously inserted between the bindings of psychological journals where they would be as safe from discovery as speeches in the Congressional Record, but even there they were handled like dangerous explosives. To-day we know that frequently consciousness has little or nothing to do with the acquisition of experience. Experience gets us instead of our getting it. To be concrete by referring to the particular form of experience which we are now discussing, man's learning processes are strikingly similar to those of the lower animals and he is quite often unconscious of the acquisition of a method or plan until he observes that he is using it. Further, if we ask what directs and controls the movements of the golf player, the answer is, visual and kinæsthetic factors which direct him without his knowing how they do it. If we push the question back a little farther

we find that the directing force is the subconscious neuromuscular effects of previous plays. A bad position or a bad movement does not 'feel' right muscularly. A negative conditioned reflex has been established between a certain erroneous position or type of movement and the end toward which the player is striving. A nervous tension exists in the coördination centers until the player succeeds in making the right movement. Then the tension is released.

The writer has said that the explanation of selection and elimination by rats in a maze when once discovered must also give an adequate account of unconscious cerebration in man. As a matter of fact all of us do more things for which no conscious justification can be found than is ordinarily supposed. For example, we cross the street at times without knowing why we do so. Again, a woman, following a cooking recipe, suddenly stops and says 'that's too much of that,' though she may not know why she says so. It should be emphasized that we are not interested in the conscious remark. The neural subexcitation is the important point.

A better illustration, perhaps, is the experience common to everyone of reading and suddenly stopping with the exclamation, 'I have read too long: I was due at that appointment half an hour ago.' Indeed, this experience is quite comparable to continuing so far along a path in mountains or maze that kinæsthetic impulses disrupt the smoothness of the neural running gear. Frequently, no stimulus can be cited to explain the sudden change or break in the continuity of neural action. An excellent illustration of the vagueness and indefiniteness of the neural subexcitation of which we have been speaking has been given by G. E. Müller.¹⁹

A friend of Müller had a clock that would not run the usual twenty-four hours, and consequently, when forgotten, it stopped. "Whenever this happens I notice it at once," says the man, "though I do not hear it at all when it is running. The first time this happened the sensation was somewhat as follows: I was suddenly aware of an *indefinite unrest*, a sort of emptiness, without being able to discover

¹⁹ 'Zur Theorie der sinnlichen Aufmerksamkeit,' p. 128.

the cause. It was only after some reflection that I discovered the cause, the stopping of the clock." The important fact in this phenomenon is not that the stopping of the clock attracted attention. With that everyone is familiar. The significant observation was the 'indefinite unrest' noticed by the observer. This is what we have called neural sub-excitation.

This is only a particular illustration of the 'indefinite unrest' that prevails in all unconscious cerebration and which, in the presence of a problematic situation, works toward a solution. Why? Probably few accept McDougall's opinion that 'purposive striving is a fundamental category' and that purposive action is prevalent 'throughout the whole animal world.' What, then, does the guiding? What causes one neural impulse to dominate? What determines the outcome of the interplay of neural forces that finally fixes the correct action patterns for the rat? This much, at any rate, we can assert: It is the interaction of neural impulses just as in the unconscious cerebration of man. None of the current theories of learning explains solving problems or finding mislaid articles in dreams. How do the cortical processes work their way, unconsciously, toward, and often to, the solution of a mathematical or scientific problem? Thus far, the real problem has not been attacked. It has been assumed that the neural processes of rats are guided *directly* by sensory stimuli though it is well known that this is not true of man's productive unconscious cerebration.

The question, how are errors eliminated, is as obtrusive in the unconscious cerebration of man as in the learning process of rats, and none of the theories thus far offered throws any light on the sudden change in relative driving force of nervous impulses in human beings by which a great invention is 'suddenly' discovered. Yet the explanation of one, when found, must fit the other. These discoveries of men are undoubtedly similar to the short cuts of lower animals—a sudden lowering of synaptic resistance and the establishment of new effective reaction patterns.

In some way not yet understood neural impulses in man

work their way out to the solution of a problem after the manner of the resolution of forces in physics. That they do this we know. How they do it is still more or less of a mystery, but it is exactly the same mystery as the elimination of errors by rats. The essential question in both cases is, What gives one neural impulse—the one that helps toward the true solution—dominance over others?

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AN OLD SOLUTION OF THE NEW PROBLEM OF INSTINCT¹

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The problem of instinct, though an ancient one, is still unsettled, and seems to be subject to an increased rather than a decreased amount of discussion. The sociologists, to whose interests the question is highly pertinent, seem at present to be contributing the major part of the discussion. Among psychologists there are, to state the situation in brief, some who have not, in spite of criticism, abandoned the older viewpoint on the subject. There are others who, while holding on to the substance of the older theories, resort to a terminology that is calculated to disguise that fact. There are still others who go the length of rejecting the conception totally. Of this latter group Watson is representative. He endeavors ^{1a} to close the discussion by denying categorically the existence of such phenomena as instincts.

The issue involved in this problem is of too great scientific and practical significance to be permitted to be laid aside in its present state of confusion of counsel. Psychologists unquestionably have a responsibility in the case, a responsibility that surely goes beyond the task, assigned them by Bernard,² of wrangling over the difference between reflex and instinct, although to settle even this question would amount to more than Bernard evidently thinks. As a science psychology may safely be presumed to be free from the bias of biological determinism on the one hand and from the environmental determinism which characterizes much of recent sociology on the other. Furthermore, the issues that underlie the problem

¹ Substance of a paper read at the meeting of the Southern Society of Philosophy and Psychology, Lexington, Va., April 7, 1928.

^{1a} 'Ways of Behaviorism,' Ch. II.

² 'Instinct,' p. 72.

of instinct are basic issues to psychology, as I shall endeavor to point out.

The old solution which I shall attempt to restate and to defend, bears upon the question of the *origin* of instincts. But by implication it at the same time has to do with the problem of the *nature* of instincts. The solution in question involves a reconsideration of, though it departs in certain particulars from, the lapsed intelligence theory. Involved in a theory of this sort, which is now generally mentioned in our textbooks of psychology for historical purposes only, are many problems of fundamental significance. It would obviously be out of the question to weigh the pros and cons of all of them. Before we can even reach the main point of this paper, however, it will be necessary to take sides respecting several controversial matters. These disputed issues and the reasons for the writer's position regarding them follow:

I. In the first place it seems necessary to take for granted the existence of instincts, by whatever circumlocutions we may choose to designate them. It is essential at certain times to lay aside terminology, against which even psychologists may acquire complexes which becloud their thinking, and face the actual phenomena under consideration. The phenomenon under consideration here might be exemplified in many ways. Out of an almost unending variety of examples of the phenomenon previously designated by common consent as instinct we may choose a well-known case, briefly described by Holmes,³ of the behavior of the crustacean *Amphithoe*.

Concerning this animal Holmes says, "I have taken the eggs from the maternal brood pouch shortly before hatching and kept them isolated in individual dishes. For some time after emerging from the egg the young were weak and had imperfect control of their movements, which were jerky and irregular. Soon the minute creatures could crawl and swim much like the adults, and the next day they began constructing nests which were the same in shape as those formed

³ 'Evolution of Animal Intelligence,' pp. 93-94.

by their parents. The attitudes in the nest, the waving of the antennæ, the beating of the swimmerets, the restless movements of the legs and mouth parts, springing after food, belligerency toward passers by, the little unobtrusive signs of timidity, the reversal of position in the nest on the approach of danger and the general behavior outside of the nest were, on the next day after hatching, almost exactly the same as in the older individuals."

This is what we shall understand to be an instinct as dealt with in the present connection. The impossibility of accounting for behavior of this sort as being the result of the conditioning effects of individual experience is obvious.

II. In the second place we find it necessary to our proposed solution to assume the existence of consciousness as a mental phenomenon, as a fact of experience, one regarding which psychology sustains a responsibility quite as great as it does toward the problem of instinct itself. Whether we choose to think of it as an experience, a stream of experiences, a process, a form of energy, an event, as psychonic energy according to Marston,⁴ or even as behavior, it does not seem possible to disregard its actuality.

III. The third issue, the settlement of which is presupposed in the theory of instinct here advocated, relates to the question of the temporal sequence of consciousness in the natural order, and hence to that of the character of the earliest organic movements. Spencer states what is, I think, perhaps the most common point of view regarding this matter. He says,⁵ "The implication is that as fast as Instinct is developed, some kind of consciousness becomes nascent." In short, that consciousness and all the higher forms of intelligence are a sort of florescence of development, a sort of outcropping of higher or more adaptable reactions from the lower and more mechanical types, may be given as the most commonly noted statement of the genetic order of development. Holmes may also be cited as giving a typical statement of the generally accepted order of temporal sequence.

⁴ *J. Abn. & Soc. Psychol.*, 1927-28, 22, pp. 140-150.

⁵ 'Principles of Psychology,' p. 435.

He says:⁶ "Intelligence grows out of the complexity and perfection of the nervous mechanism, and along whatever line organization reaches a certain degree of development intelligence appears on the scene."

The position here taken is that this is the reverse of what has been the genetic order of sequence between instinct and the simple, indeterminate, and conscious strivings which we may regard as the primordial form of intelligence. We find it to be of the very nature of consciousness, when related to any such indeterminate form of behavior, to subside instead of becoming 'nascent' as the process of mechanization takes place. In the higher forms of mechanization, such as habits, compound reflexes and instincts, it is of course true that intelligence becomes released from complete occupation with lower and simpler processes and is thus enabled to acquire newer and higher types of adjustments. In this sense, and in this sense only, I believe, may instinct and mechanization in general become forerunners of intelligence. Even here however, there is no essential change in the original genetic order, for in its incipient and simple form of mere sentient striving this same 'intelligence' may be considered to have antedated the very mechanism by which it subsequently becomes released for its newer and more complex tasks. And moreover, even in its higher forms it is, surely, just as correct to consider it to be the first stage of a new series as it is to consider it to be the last stage of an old series, according to Spencer, Holmes and many others.

In view of these considerations I feel compelled to accept the conclusion of Wundt, Ward, Titchener, Herrick, Cope, Jennings and others that consciousness is coeval with animal life itself, that, instead of waiting to enter a preformed and specialized nerve structure, somewhat as a bride would enter a home made ready in anticipation of her coming, as Spencer and Holmes seem to hold, it has always functioned in the phyletic series as it is known to function in the ontogenetic series, that is, it has appeared in maximum degree in the earlier stages of new acquisitions, and has tended to subside as these have become progressively automatized.

⁶ 'Evolution of Animal Intelligence,' p. 180.

There can, of course, be no such thing as a function without a structure of some sort. It does not seem possible to escape the general observation, however, that, phyletically speaking, function has antedated *specialized* structure, so far as the physiological processes are concerned. Digestion appeared before stomachs or even alimentary canals; locomotion did not wait for the development of legs or wings, and so on. It scarcely seems likely that this would be true of one realm of life processes and not of others. The application of the law, if it can be so termed, to the problem of the genesis of instinct is tantamount to a statement of the theory of the origin of instincts which I am endeavoring to advocate. I therefore agree with Herrick that the total disregard of the function of consciousness in its relation to development is 'unphysiological.'⁷

IV. The fourth and final disputed issue concerning which I am forced to take sides relates to the function of consciousness in the living order. The position here espoused is that the epiphenomenalistic conception of consciousness which is peculiar to radical behaviorism makes impossible any conceivable plan of evolution. The only way to avoid inextricable difficulties in working out a consistent account of mental development is, I hold, to assume the causal efficiency of consciousness. It is just possible that the faith which certain psychologists have in the all-sufficiency of the 'neurological formula' as a principle of explanation would be altered by a profounder knowledge of the limitations of this formula. At any rate, we find so competent a neurologist as Herrick saying⁸ that consciousness 'is a factor in behavior, a real cause of human conduct, and probably to some extent in that of other animals.' Consciousness to him also is 'co-extensive with life itself.' He means by consciousness what I dare say most psychologists who deal with it at all mean by it, *i.e.*, 'not some metaphysical psyche,' but 'an integral and necessary part of certain higher behavior complexes, a part whose essential attribute (awareness) knits in with the rest

⁷ 'Neurological Foundations of Animal Behavior,' p. 304.

⁸ 'Neurological Foundations of Animal Behavior,' p. 304.

of the complex in a way no more unphysiological than the way the negative variation knits in with the process of conduction in a nerve fiber.'

Not only may a psychologist be misled as to the possibilities of neurological explanations, but he may also be misled by reason of a conception of causation which would not even hold in physics, not to say anything about psychology. Indeed, back of much of the opposition to the idea of the causal efficiency of consciousness, one may often suspect that there lies a crude and anthropomorphic notion of causality in general as some sort of entity or force passing across from one event to another. Causality should mean in psychology what it can only mean in physics, namely, a sequence or invariable concomitance under known conditions.⁹ To assume the causal efficiency of consciousness is nothing more nor less than to assert that animals act differently when they are conscious from the way in which they act when they are unconscious. To deny this assumption is to assert that the course of the history of living creatures would have been the same had they been wholly unaware of their surroundings.

To return to the theory of the origin of instincts here advocated we can, through limitations of space, only say that the chief alternative theory, namely, that they originated in the chance outcroppings of advantageous concatenations of reflexes, seems to involve the reduction of the probability of survival to a very low point. For instance, one chance of success out of a possibilities means $1/a$ chance of success. In a series of a, b, c, d, e, \dots steps, the chance that the right step will be taken in each instance throughout the whole series will be represented by the fraction $\frac{1}{abcde} \dots$. Placing the average of a, b, c , etc., even as low as 100 would act to make survival practically inconceivable.

No one has stated this difficulty of the Neo-Darwinian Hypothesis more forcefully than Bergson. He points out ¹⁰

⁹ Taylor's 'Metaphysics,' p. 170.

¹⁰ 'Creative Evolution,' pp. 169-170.

that "the evolution of instinct could have come to pass only by the progressive addition of new pieces which, in some way, by happy accidents, came to fit into the old. Now it is evident that, in most cases, instinct could not have perfected itself by simple accretion: each new piece really requires, if all is not to be spoiled, a complete recasting of the whole. How could mere chance work a recasting of the kind? I agree that an accidental modification of the germ may be passed on hereditarily, and may somehow wait for fresh accidental modifications to come and complicate it. I agree also that natural selection may eliminate all those of the more complicated forms of instinct that are not fit to survive. Still, in order that the life of the instinct may evolve, complications fit to survive have to be produced. Now they will be produced only if, in certain cases, the addition of a new element brings about the correlative change of all the old elements. No one will maintain that chance could perform such a miracle."

J. Mark Baldwin attempted to meet this difficulty by his somewhat forgotten theory of orthoplasia. This theory attempted to supply some sort of agency for "directing the course of evolution through organic selection."¹¹ In order to get rid of the disadvantages of purely chance variation he suggested (*ibid.*, p. 172) that "individual modifications or accommodations supplement, protect, or screen organic characters and keep them alive until useful congenital variations arise and survive by natural selection." This would obviously provide for taking care of advantageous variations once they appeared, but it leaves unexplained the very thing we most need to know, namely, how the right combinations of variations come about.

It is recognized that historically the lapsed intelligence theory involves the assumption of the Lamarckian hypothesis of the inheritance of acquired characters. And it is appreciated that since the work of Weismann, and in spite of the striking, if unsubstantiated, findings of Kammerer, this hypothesis is subject to serious question. There is, I believe,

¹¹ 'Evolution and Development,' p. 152.

a possibility of harmonizing these two seemingly irreconcilable schools of opinion. The essential conflicts between them seem to me to disappear once we have introduced a more historic or genetic method of viewing the problem. May we not assume that, whatever may be the present factual justification of Weismannism, originally, in the early life forms, conditions being vastly different from what they are at present, the transmission of the effects of individual experiences was universal?

Intelligence, as we know, on the automatization of any process with which it has been engaged, becomes released, and may, if there be need, become occupied with progressively higher tasks for which there are no ready-made provisions, or it may, conceivably, cease to function. Whether the animal's mental processes become released for higher adjustments as in the case of the human being, or statically mechanized, as in the case of the insects, would necessarily depend upon a variety of circumstances. It is therefore possible for instinct either to precede or supersede intelligence. That it has done both in the natural order of development there is good ground to believe. Failing to appreciate this fact Whitman¹² urges that "instinct precedes intelligence both in ontogeny and in phylogeny."

Whitman shares with others the unwillingness to ascribe intelligence to lower forms of life. He says (*ibid.*) that if the lapsed intelligence theory were true "we should expect to find the lowest animals free from instinct and possessed of pure intelligence," whereas in the higher forms "we should expect to see intelligence lapsing more and more into pure instinct." There are several ways of meeting these objections. In the first place, taking the same ground of logic, and granting that, as Whitman claims, instinct 'has furnished all the structural foundations employed by intelligence,' should we not expect insects to be more intelligent even than man, since they possess such superior 'structural foundations' of intelligence?

In the second place the theory of lapsed intelligence does

¹² Woods Hole Lectures, 1898-9.

not imply the ascription to the lower forms of life of an intelligence such as we associate with human beings. It might, indeed, be better designated the 'theory of lapsed conscious striving,' meaning by that the presence in the lower forms of life of a vague awareness and an indeterminate and random striving, which in the process of evolution, by virtue of the inherited effects of such experiences, become determinate, mechanized. It is held, for instance, that such body processes of the human being as those of blood circulation, breathing, etc. cannot be assumed to have been cared for at all stages of our phyletic history by specialized and autonomic structures and centers of nervous control. On the contrary it seems necessary to assume that functions like these have *become* automatized in the process of organic evolution. The difficulties in the way of assuming the chance outcropping of complicated structures and systems of structures specifically adapted to care for such biologically necessary functions as these are insuperable. That automatization, wherever it is found to occur in nature, whether in the form of organic reflexes and systems of reflexes, or in concatenations of reflexes which are called instincts, is always to be regarded as a development *from* processes that were not originally automatic, is the major premise of the theory of instinct here advocated.

Yet, while it seems impossible to avoid such a conclusion as this, so many confirmations of it do we find on every hand, it is nevertheless far from easy, in the light of present knowledge concerning the physical basis of heredity in the genes of the chromosomes, to imagine how the effects of conscious strivings toward adjustments in the lower orders may have served to bring about through heredity such automatizations. To offer a suggestion concerning the solution of this dilemma is the excuse for this paper. The solution is with the writer original, though it is entirely possible that in the voluminous literature of this subject others may have suggested it. I realize that the suggested solution will be acceptable only to those who are sympathetic with the writer's attitude toward the foregoing disputed issues. But to such as these I am

inclined to believe it will appear at least to deal with, whether it solves or not, the chief perplexity concerning the origin of instinct. The suggestion is this:

In the earlier forms of life animal protoplasm was of such character as to make possible the transference of the effects of individual experiences to offspring; but with the increase of differentiation of structure and specialization of function the hereditary transmission of such effects became increasingly difficult and increasingly dysgenic, in that it involved the inheritance of the effects of losses and mutilations, which are the more serious the more highly specialized the organism. Hence, through selection, there must have begun in the phylum a tendency toward the disappearance of this characteristic, so that we may say that the Lamarckian hypothesis holds true when applied to the lower or older end of the phyletic series, and Weismannism becomes more and more strictly applicable to the conditions found to exist in the more highly differentiated structures of recent life forms.

The grounds for the acceptance of the fact of such an evolutionary transformation as this are too numerous to be stated in detail here. We know, for instance, that in organisms existent to-day the reproductive cells are not isolated in the same degree. Certain plants, for example, will grow from cuttings. In these cases the reproductive elements must be assumed to be resident in various parts of the organism. May we not from this venture to generalize by saying that probably the transmissibility of the effects of mutilations and of all other forms of individual experience has been affected by the changes in the extent of diffusion of the reproductive elements through the soma?

There are at hand, fortunately, even more convincing facts than these. That unicellular animals do transmit the effects of experience has recently been demonstrated by Dr. Stewart of Cheddleton Mental Hospital, England. In the *Journal of Mental Science* of 1926 (pp. 582-587) he tells how by the process of subjecting certain colon bacilli to various sugars he was able to derive different hereditary forms. For instance he derived *Bacillus coli communis* from *Bac-*

terium coli mutabile and also from *Bacillus paracoli*. These bacilli differ very sharply in the important power of fermenting lactose. The variations which he produced in these organisms occurred always as adaptations to changes in environing conditions, such as exposure to various sugars. The variations, too, corresponded to those described by De Vries as 'mutations.' But, to cite what is more pertinent to the question of the origin of instinct, these variations proved to be rigorously hereditary. In summarizing his results Dr. Stewart considered that he had arrived at 'an hypothesis of the greatest importance to the theory of evolution.' While his findings dealt exclusively, of course, with now existent unicellular structures, I believe that they will afford an *a fortiori* justification of the above suggested theory concerning the inverse genetic order of Lamarckian and Neo-Darwinian inheritance, and thus pave the way for a consistent theory of the origin of instincts.

The theory to which the logic of the above facts leads is, I believe, fundamentally that of the lapsed intelligence, or as we prefer to designate it, the theory of lapsed conscious control. Aside from the behavioristic tendency to rule consciousness entirely out of consideration in psychology, the only cogent objections that have ever been raised to this theory of the origin of instincts have been the two objections stated by Angell,¹⁸ namely, that it by implication ascribes intelligence to the lower animal forms, and secondly that it implies the inheritance of acquired characters. It seems to me that in the light of the foregoing considerations each of these objections has been adequately met.

This theory does not imply that instincts of the mammals were acquired by the protozoa, nor does it imply that Lamarckian transmission ceased with the appearance in the phylum of specialized structures. It only *began* to cease. Possibly it has not even yet wholly disappeared. This paper presents a suggestion as to how we may pass, in our scientific explanations, from the demonstrated fact of Lamarckian transmission in unicellular organisms to the equally incon-

¹⁸ 'Introduction to Psychology,' p. 222.

testable findings of Neo-Darwinism exhibited in the higher life forms.

SUMMARY

1. The lack of a conceivable account of the origin of instincts has doubtless helped to bring about the present disposition to question their actuality, and incidentally has also served to color our thinking in respect to other related problems that are of significance to psychology.

2. The doctrine of the inheritance of acquired characters has always made the origin of instincts conceivable. But this doctrine has lost its plausibility since the work of Weismann.

3. It is suggested in this paper that use may be made of the Lamarckian hypothesis without doing violence to Weismannism provided we recognize the former as applicable to the earlier or simpler life forms and the latter as increasingly applicable to the more recent or more highly differentiated types of organism. This suggestion has more than a theoretical warrant in the light of recent experiments with colon bacilli.

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RELIGIOUS LEADERSHIP AND STABILITY

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The writers have stressed in previous articles the conflicting points of view set forth by various writers in reference to the nature of genius (1). A present-day attitude that is given rather general credence is exemplified by Miss Cox who, after studying three hundred men of recognized genius, concludes that the genius is exceptionally stable and well-balanced (2).

The studies of Cox apparently corroborate the findings of Terman, Hollingworth, *et al.*, who object to the theory that genius and nervous instability generally accompany each other. The observation that the genius is neurally stable has resulted from genetic studies of gifted children. Davis summarizes the data to this effect:

Contrary to the popular belief current some ten years ago, all these studies indicate that as a rule, the unusually capable child, instead of being a one-sided product, over-developed in one or two respects at the expense of all others, is really an all-round individual, not only highly endowed intellectually, but superior in moral, social, and personality traits as well. Cases in which these conclusions are not borne out are conspicuously few (3).

Terman also emphasizes the general superiority of gifted children.

The data show that the physical and mental traits which characterize typical gifted children appear to warrant the belief that more intense educational effort in their behalf on the part of the school would not involve the risks which various writers have feared. The 'eccentricity of genius' is largely a myth (4).

The general adequacy of adjustment of the gifted child is illustrated by the following:

. . . gifted children usually conform more readily (than the average run of children) to the moral and ethical standards of society . . . (5).

There is at hand sufficient experimental evidence to show that superior children mingle easily with other children, and as a rule show little difficulty in adjusting themselves either to an older or to a younger group (6).

Gifted children appear to be well-adjusted to their environment; they are superior to children of average mentality in their physical development and moral growth. These children are not of lop-sided development. The older view that precocity is accompanied by eccentricity and that madness and genius are intimately associated is considered to be no longer tenable.

If it be demonstrated that children of high I.Q.'s are the future geniuses, then apparently genius and eccentricity *do not* go hand in hand. The validity of the above assumption rests upon the answer to the following question. Are the geniuses of the future to be numbered among the children who now earn high intelligence ratings? The term genius has been applied by Terman and his co-workers to such children. Hollingworth states that it seems best not to describe children of high I.Q. as geniuses but to substitute 'gifted,' the term previously suggested by Whipple. "Gifted children are those identified by mental tests as very superior to the average" (7). The assumption is set forth clearly by Hollingworth that gifted children actually can be selected by means of mental tests. The validity of this assumption rests upon decision as to what mental tests really measure and upon decision as to what general intelligence actually is.

Terman feels that there is sufficient evidence at hand to warrant the assumption that from the ranks of the gifted and from nowhere else will come our future genius in every line of endeavor.

One reason for the general neglect of this field of pedagogy has been the widespread belief that the apparently gifted child is merely precocious, and usually pathologically so. However, recent experimental studies have shown conclusively that this

belief has little or no foundation in fact. All the scientific evidence at hand points to the conclusion that gifted children are superior to unselected children in physical and non-intellectual mental traits as well as intelligence and that they carry this advantage into adult life. *We are coming to recognize that from their ranks and from nowhere else, our geniuses in every line are recruited* (8). (Italics ours.)

In the above quotation the extreme point of view is set forth. From the gifted (children of I.Q. 140 and above) *and from nowhere else* our geniuses in every line are recruited. Here, we have over-simplification in the extreme—genius in every line of endeavor reduced to a magical formula—I.Q. 140 and above.

Study of genius is fraught with difficulty. The *a priori* studies of Terman may or they may not be studies of *actual geniuses*. Miss Cox's *post mortem* studies of genius seem to substantiate the assertion of Terman and Hollingworth that the eccentricity of genius is a myth. In this paper the writers will adduce evidence showing rather conclusively that the eccentricity of one type of genius is hardly mythical. This paper will discuss the problem of the stability of the religious genius.

Religion is difficult to discuss impartially because of the prejudices and convictions which we acquire early in life. It is nevertheless interesting and valuable to attempt to account for the origin of and man's general participation in religious enterprises. All powerful organized institutions owe their existence to the fact that they satisfy (to some extent at least) certain rather general human desires. Organized religion like all other institutions appears to serve such an end.

The writers have commented previously upon the tendency of men to seek satisfaction vicariously when desires are thwarted or precluded (9). Man is admirably equipped for rationalization. So frequent and so general is the tendency to secure satisfaction vicariously that numerous strong organizations have developed which appear to owe their origin and their maintenance almost solely to man's tendency to

rationalize. Many of these devices and institutions are group enterprises; some of them actually seem to foster the maximum development of the group. The church, with its attendant activities, affords compensatory satisfaction to thousands. It is common knowledge that religious denominations attract followers most easily and frequently in times that are trying and difficult. Material success and prosperity are not the greatest boons to religious fervor or conversion. This fact is sometimes paraphrased, 'Man's extremity is God's opportunity,' a phrase which implies that religion provides escape from intolerable situations. The peace and satisfaction following conversion bring much individual happiness. However, individual good is not the sole product of such substitute endeavor, for group welfare and happiness probably are fostered by the coöperative enterprises developing about the church.

The writers have assembled data which offer convincing evidence of the strength and the satisfyingness of religious zeal as a mechanism of indirect gratification. Negro children were found to engage in religious activities with much greater frequency than white children (9a). The writers feel that the negro's excessive interest in religious activities results from an attempt to compensate for frequent thwarting, since the religious activities appear to offer intensely satisfying modes of escape from reality.

Some might assert that the negro exhibits great interest in religious activities because of his relatively primitive nature. In contact with the white man, the negro abandons many of his primitive customs, emulating the white in dress, manners, and in many ceremonies and rites. He does not, however, follow the white man's example in reference to church activities; the negro persists in frequent participation in the ceremonies associated with church attendance. This apparently contradictory tendency offers possibilities of interesting speculation.

The writers do not pretend to be able to 'explain' in any ultimate sense the negro's interest in things religious. It seems reasonable, however, that in many instances the

activities associated with the church and Sunday school are participated in because they provide satisfaction denied in the world of actuality. Probably no one would deny that the negro is cognizant that his social status is inferior to that of the white. Negro children are doubtless aware of their lack of social prestige from very early ages. It would be strange indeed if the negro's relatively inferior status (social, economic, intellectual, educational) did not produce in him active impulse to extend his personality and secure satisfyingness indirectly. It is possible therefore that church and Sunday school activities provide *easily obtainable and intensely satisfying* means of *escape* from the unmistakable evidences of inferiority which attend the negro's daily contact with white men.¹

It is perhaps needless to remind the reader that the negro child's participation in religious activities reveals nothing at all in reference to the *effect* of church-going upon his moral conduct. Odum maintains that the negro's religion is not one of daily application.

The church has been called the central point around which all Negro life revolves. It is certainly a great influence in the life of the Negroes and furnishes them with the greater part of their better life and the outlet for much of their energy. The function of the Negro church is rather to give expression and satisfaction to social and religious emotions than to direct moral conduct (10).

It is impossible to defend or deny the above allegation. However, until evidence is adduced to prove that the moral conduct of negro children is superior to that of white children, it seems tenable that *mere attendance* at church and Sunday school does not necessarily result in superior moral conduct. It is possible that the negro, with his highly emotional nature, secures so much gratification from church activities in the form of 'emotional glow' that he later feels no need for performing 'good works.'

Religion appears to provide compensatory gratification for the white man as well as for the negro. Browne emphasizes the satisfyingness of religious experience in the following:

¹ Parades, ceremonies, conspicuous dress, and the pomp of which the negro is so fond, appear to have a function similar to that of religion.

Strange potency, this thing we call religion! . . . That cowering Yemenite Jew slinking in the shadow of the archways sloughs off his terror and becomes a king when he enters his synagogue. His bent shoulders straighten, his sagging knees become firm, and the blessedness of peace lightens his eyes. . . . That blind Arab beggar, a mere frame of bones hung over with smelling rags, becomes a sultan when he stands at prayer in his mosque. He stands healed there of his ailments; he becomes a changed man with a vision reaching through his world to Paradise. . . . That dark-eyed Syrian girl, poor trull whose lips have caressed the flesh of twenty races, becomes clean once more when she kneels at the feet of the virgin. Strength floods into her tortured bones, healing comes to her flesh. Life so long a hell of lust and lechery, becomes now wondrously clean and worthy. She feels saved—*saved!* (11).

Seashore also mentions the fact that religious faith makes possible extension of personality; that religion is an escape mechanism, a device by means of which an individual frees himself from environmental inhibitions and feelings of inferiority.

The sense of freedom is prominent in religious life . . . the self-expression of the soul set free. We play when we are free; religion has always been a breaking away from the bonds and cares of this world. . . . We play when we are in need of recreation; religion is not only a haven of rest but a fountain for the renewal of life's energies. The freedom which in ordinary life comes from a sense of freedom in movement is limited in comparison with that freedom which comes to the devout in taking hold of the infinite by faith.

The feeling of extension of personality finds its fullest expression in the religious attitude. . . . Faith is power. In a very real sense we are what we believe ourselves to be (12).

If participation in religious activities results in part from the desire to secure satisfaction for thwarted human desires it is logical to infer that many religious leaders are driven to the church as an avenue of escape. This is precisely what is found in many instances. Indeed, so often are nervous instability and religious genius associated that William James asserted that religious genius is invariably accompanied by nervous disturbance (13).

If you ask for a concrete example, there can be no better one than is furnished by the person of George Fox. The Quaker religion which he founded is something which it is impossible to overpraise. . . . No one can pretend for a moment that in point of spiritual sagacity and capacity, Fox's mind was unsound. Every one who confronted him personally, from Oliver Cromwell down to county magistrates and jailors, seems to have acknowledged his superior power. Yet from the point of view of his nervous constitution, Fox was a psychopath or *détraqué* of the deepest hue. His journal abounds in entries of this sort (14).

. . . George Fox was an hereditary degenerate (15).

It is well known that nervous instability characterized many of the saints. Even the energetic ones such as Teresa and Loyola possessed that special grace, the gift of tears. In these persons, the melting mood held almost uninterrupted dominance over their behavior.

Many religious leaders have exhibited automatisms. In some, these manifestations were habitual; in others they occurred only occasionally.

It is easy to discriminate between the religious leaders who have been habitually subject to inspiration and those who have not. In the teachings of Buddha, of Jesus, of Saint Paul (apart from his gift of tongues), of Saint Augustine, of Huss, of Luther, of Wesley, automatic or semi-automatic composition appears to have been only occasional. In the Hebrew prophets, on the contrary, in Mohammed, in some of the Alexandrian, in many minor Catholic saints, in Fox, in Joseph, something like it appears to have been frequent, sometimes habitual. We have distinct professions of being under the direction of a foreign power, and serving as its mouthpiece (16).

The pages of the history of religion are filled with the anxieties, the doubts, and the obsessions of a group of neurotics whose instability undoubtedly was a determining factor in effecting their genius.

The reader is likely to ask whether the writers are not employing the term genius with extreme elasticity. The question arises: What type of endeavor is sufficiently unusual and vital to be classed as a work of genius? When Terman

states that our geniuses in every line of endeavor will emanate from the ranks of children of I.Q. 140 and above, he helps the writers in making a difficult decision. The reader may question the inclusion of many of the names of religious leaders in the category of genius. However, the subsequent influence of all the men herein discussed has been marked and therefore merits attention. Whether or not one accepts the postulate that the conspicuous leaders in religious thought and activity are geniuses, he must be impressed by the character of these men.

The activity of these leaders is the activity of a composite of unstable individuals; the pages of religious history are filled with the phobias and obsessions of neurotics. If it be true that leaders in religious activities are often (if not generally) unstable, the question arises: Why should the field of religion be one to which the unstable persons turn so frequently? The hypothesis advanced to account for the unusual frequency of church attendance among negroes may be used again. The church offers numerous and varied channels for vicarious satisfaction for the afflicted, the downcast, the tortured. Within the church are found numerous and varied (and easily obtainable) avenues of escape. Indeed, the church presents an intricate and elaborate web of such activities. He who is ill in body is healed; he who is mentally sick is cured. The repentant can be forgiven; the countless sins of a lustful life can vanish in one supreme gesture. Conversion offers an extremely satisfying mode of behavior for the hysterical and the subsequent confessions provide continued opportunity for similar expression. One must not overlook the doctrine of equality stressed by the church. The ignorant, the oppressed, the persecuted become on entering the portals of the church the *equals* of the most powerful and unrelenting leaders.

It is of course generally accepted that the neurotic individual is the very one whom life most often thwarts. The entire life of the neurotic person is a series of devastating anxieties and impelling dreads. A way out is sought. The church stresses the very desires precluded in life; it offers

ready participation in the very activities which satisfy. It is not surprising therefore that the harvest of the church is often a miscellaneous assembly of the oppressed, the sick, and the neurotic.²

Some may object to this discussion upon the ground that man is inherently religious, that the motive which conditions religious experience is based upon a religious instinct. Behavioristic psychology certainly would be hesitant to accept such a simple explanation of the complex modes of adjustment assembled under the caption religion. There seems to be no instinctive tendency which provokes in man the varied forms of substitute gratification stressed by the church. The numerous and varied forms which religion takes give striking evidence that original nature provides no set response which may be termed an instinct of religion. The various cults differ tremendously in their religious ceremonies. The chief likeness of the various religious denominations is the emphasis placed by all upon escape from reality—compensation.

The writers are not raising the question of the desirability of religious experience in fostering individual and group welfare. They feel that many of the activities of the church foster wholesome group enterprise and enhance happiness. Nor do the writers contend that the *only* motive actuating religious zeal is the desire to escape from the thwarting of life. They do assert however that one important element affecting church attendance is the desire to secure satisfaction vicariously. He who is thwarted most by life has the greatest need for compensation—and religion. It is obvious that the neurotic man or woman leads a life full of obstacles to his desires. He is thwarted at every turn. It is not surprising that such an individual often seeks religion. It is to be expected also that *some* who seek most earnestly and persistently fail to find in the church the relief which they seek.

² The following promises are illustrative of what the church has to offer: "Come unto me, all ye that labor and are heavy laden, and I will give you rest." Matthew 11: 28.

"They shall hunger no more; neither shall the sun light on them, nor any heat. For the Lamb which is in the midst of the throne shall feed them and shall lead them unto living fountains of water; and God shall wipe away all tears from their eyes." Revelation 7: 16, 17.

Some unstable individuals are unable to obtain the much desired relief in the church. After seeking satisfaction in the church and reaping disappointment, some manifest obvious symptoms of instability. It is assumed often that religion is the causal factor in producing the instability in such cases. It is sometimes stated that a given individual has gone insane over religion. It is more likely that the very instability which produced excessive interest in religion brought also the ultimate insanity.

In the light of the previous discussion, it is interesting to examine specifically the character and the work of certain acknowledged leaders of the church.

MARTIN LUTHER

Among religious leaders Luther is of course an outstanding personality. Few leaders have been so successful in bringing about reform as was Luther. William James points out that Luther found his life a burden, that he looked forward with pleasure to the end.

'I am utterly weary of life. I pray the Lord will come forth-with and carry me hence. Let him come, above all, with his last Judgment; I will stretch out my neck, the thunder will burst forth, and I shall be at rest.'—And having a necklace of white agates in his hand at the time he added: 'O God, grant that it may come without delay. I would readily eat up this necklace to-day, for the Judgment to come to-morrow.'—The Electress Dowager, one day when Luther was dining with her, said to him: 'Doctor, I wish you may live forty years to come.' 'Madame,' replied he, 'rather than live forty years more, I would give up my chance of paradise' (17).

Until one has read the details of Luther's life it is incomprehensible that Luther should have objected to a long life on earth. Luther suffered from poverty, weak health, and particularly from fear that he was doomed to eternal torment in life after death. Like Bunyan, he fell into the deepest despair. Carlyle gives the following resumé of Luther's experiences.

I find it altogether suitable to Luther's function in this earth . . . that he was born poor, and brought up poor, one of the poorest of men. He had to beg, as the school children in those times did; singing for alms and bread, from door to door. Hardship, rigorous necessity was the poor boy's companion. . . . A boy rude of figure, yet with weak health, with his large greedy soul, full of all faculty and sensibility, he suffered greatly. . . . He says he was a pious monk . . . faithfully, painfully struggling to work out the truth of this act of his; but it was to little purpose. His misery had not lessened; had rather, as it were, increased in infinitude. The drudgeries he had to do, as novice in his Convent, all sorts of slave-work, were not his grievance; the deep earnest soul of the man had fallen into all manner of black scruples, dubitations; he believed himself like to die soon, and far worse than die. One hears with a new interest for poor Luther that, at this time, he lived in terror of the unspeakable misery; fancies that he was doomed to eternal reprobation. . . . He fell into the blackest wretchedness; had to wander staggering as on the verge of the bottomless Despair (18).

Luther's own testimony of his experiences with the devil is given in his 'Table Talks.'

Last night as I waked out of my sleep, the devil came and said: God is far from thee, and hears not thy prayers. Whereupon I said: Very well, I will call and cry the louder (19, p. 266).

The devil often assaults me, by objecting, that out of my doctrine great offences and much evil have proceeded, and with this he many a time vehemently perplexes me. And although I make him this answer: That much good is also raised thereby, which by God's grace is true, yet he is so nimble a spirit, and so crafty a rhetorician, that, master-like, he can pervert this into sin. . . .

What I teach and preach, I teach openly, by clear daylight, not in a corner. I direct the same by the gospel, by baptism, and by the Lord's prayer. Here Christ stands, him I cannot deny; upon the gospel do I ground my cause, etc. Yet the devil, with his crafty disputing, brings it so near unto me, that the sweat of anguish drops from me (19, p. 269).

In his autobiography Luther writes:

Once, in our monastery at Wittemberg, I distinctly heard the devil making a noise. I was beginning to read the Psalms, after having celebrated matins, when, interrupting my studies, the devil came into my cell, and thrice made a noise behind the stove, just as though he were dragging some wooden measure along the floor. As I found he was going to begin again, I gathered together my books, and got into bed. . . . Another time, in the night I heard him above my cell, walking in the cloister; but, as I knew it was the devil I paid no attention to him, and went back to sleep (20).

Some modern psychologists might explain the above episodes as types of dissociation. Certainly, Luther's experiences were pathological. It is difficult to conceive to-day that Luther believed in a personal devil who roamed the world and appeared in various forms from time to time. Yet Luther accepted these convictions as actual facts, for his own sense-organs afforded undeniable proof of the existence of a flesh-and-blood Satan. He states that the devil appeared and often conversed with him (19, p. 269). The devil not only talked with Luther; he also attacked Luther's teachings and protested against his work. The invectives directed by Luther toward the devil and the equally bitter responses of the devil prompted Luther on one occasion to hurl an ink-stand at the offender (20, 21).

The fear of the devil became a persistent torturing obsession, which accounted in part for the religious frenzy of this renowned leader. Preserved Smith attributes the obsessions and general nervous instability of Luther to physical weakness and disease (22). The biographical literature concerning Luther contains frequent accounts of his illness. That Luther's obsessions are traceable solely to his physical condition is certainly questionable. However, that Luther possessed an unbalanced personality and that this lack of balance determined the direction of his interest seem evident.

To begin with, most assuredly he was never mad; at the most one could fairly say that, like most of the great leaders of thought, Luther was probably of the manic-depressive temperament, with

that strange mixture of apparently insane egotism and gloomy pessimism that so marks people of that temperament (23, p. 118).

MacLaurin gives the following account of Luther.

From about the age of thirty he suffered from dreadful noises in the head, banging, whistling, thumping, and crashing. These were accompanied by terrible attacks of giddiness, which sometimes actually caused him to fall from his stool and rendered work impossible. Towards middle life he became so neurasthenic that his mental condition became almost that of a lunatic—and indeed the Catholics did not miss the opportunity to say that he had actually become mad; but probably this was but a tit for Luther's own tat of extraordinary theological violence, and was certainly never true. But what is true is that he began to suffer from pains in the region of the heart, accompanied by a sense of dreadful oppression, so that sometimes he thought himself to be dying. As he grew older he became very deaf, and his cardiac distress became still more terrible (23, p. 121).

MacLaurin is very careful in insisting that it is impossible to render an accurate diagnosis of Luther's ailment. In order to do so with precision it would be necessary to observe the patient over a period of time. This of course is impossible. Describing Luther's experiences and their *probable implications* MacLaurin speculates:

All these things were to Luther certain evidence that his personal devil was attacking him;³ . . . all these things can be explained easily—as Dr. Cabanes suggested—if we suppose that Luther was suffering from Meniere's disease of the labyrinth, a disease of the inner ear that occasionally attacks middle-aged and gouty people, and is supposed to have added its tragedy to Dean Swift's already tragic life. . . . And the fact that Luther's deafness steadily increased as he grew older seems to show that it was really caused by Meniere's disease. In 1541 he seems to have suffered from middle-ear disease, accompanied by dreadful earaches and discharge from the ear; while this lasted he became temporarily deaf, but all the time the labyrinthic disorder was going on (23, pp. 121-122).

³ That Luther actually did connect the buzzing in his ears with the devil's visitations is evidenced by the following passage from his autobiography. "When I was at Coburg, in 1530, I was tormented with a noise and buzzing in my ears, just as though there was some wind tearing through my head. The devil had something to do with it" (20, p. 338).

That the preceding account of Luther's physical ailment is not exaggerated may be seen from Michelet's 'Life of Martin Luther.' Michelet cites numerous instances in which Luther manifested rather unusual bodily ailments.

Towards the close of the year 1527, Luther was himself several times attacked with illness both of body and of mind (20, p. 204).

Two intimate friends of Luther, doctor John Bugenhagen and doctor Jones, have left us the following account of an alarming swoon into which Luther fell toward the end of this year. "On the Saturday of the visitation, in the afternoon, doctor Luther complained of great pains in the head and of a violent buzzing in the ear. He felt convinced that he was going to die. Early next morning, he sent for doctor Bugenhagen to receive his confession. He spoke to him with terror of the temptations which he had been undergoing of late, entreated his support and his prayers for him with God, and concluded by saying: 'Because I sometimes wear a gay and joyous aspect, many people fancy that my path is one of roses; God knows how different is the fact'" (20, p. 205).

In the afternoon of the same day, he (Luther) fell quite senseless on the floor, became cold, and gave no sign of life. When, by the zealous attentions lavished upon him, he was restored to himself, he began praying with great fervor: 'Thou knowest O God,' said he, 'that I would willingly have poured forth my blood for thee, etc., etc.' (20, p. 205).

MacLaurin thinks that Luther's mental condition was the result of his bodily condition and that physical and mental abnormalities were contributory causes of his accomplishment in religious activities (23). It seems reasonable that the constant appearance of 'the devil' played an important part in spurring Luther to greater and greater religious zeal. Luther was a tortured and obsessed man who needed the attention of a physician and the services of a psychiatrist. Since scientific investigation of his physical condition was impossible at that time, Luther attributed his illnesses to a supernatural power. One must realize however that such a gesture itself is undoubtedly a manifestation of an unstable constitution. Luther's obsessions of course resulted in part from his poor health. He was undoubtedly a psychopath and religious zeal afforded a satisfying outlet for his persistent obsessions.

TOLSTOY

The Russian, Tolstoy, although not primarily a religious leader, is another character in whom religious obsession played an important rôle in determining the nature of his attainment. In 'My Confessions' a most interesting account of an attack of melancholy is narrated.

Tolstoy began to have moments of extreme perplexity and doubt when he was about fifty years of age. He felt that he did not know 'how to live' or 'what to do.' James is of the opinion that these were moments in which the excitement and interest which normal functioning of the organism brings, had ceased. In other words, Tolstoy was a sick man. The questions 'Why?' and 'What next?' began to harass him more and more frequently. They finally resulted in a chronic state of anxiety and suffering.

'I felt,' says Tolstoy, 'that something had broken within me on which my life had always rested, that I had nothing left to hold on to, and that morally my life had stopped. An invincible force impelled me to get rid of my existence, in one way or another. . . .

'Behold me then, a man happy and in good health, hiding the rope in order not to hang myself to the rafters of the room where every night I went to sleep alone; behold me no longer going shooting; lest I should yield to the too easy temptation of putting an end to myself with my gun.

'I did not know what I wanted. I was afraid of life; I was driven to leave it; and in spite of that I still hoped something from it' (13, pp. 153-54).

The experience of Tolstoy is by no means unparalleled among religious leaders. Not only does one find numerous cases beset by fears and anxieties, but one finds also many cases who appear to receive guidance or admonition from mysterious voices. Throughout the literature upon religion, there is frequent allusion to intuition, to divine prompting, to guiding mysterious voices. Indeed, about 1820, one finds in America a movement directed toward effecting a general acceptance of a doctrine that would provide a satisfactory adjustment for most individuals who experience the divine

promptings. In the writings of Emerson one finds the doctrine of transcendentalism clearly presented (24).

TRANSCENDENTALISM

'The Transcendentalist' sets forth the doctrine of idealism. Transcendentalism, Emerson says, is idealism. There are two classes of individuals, the materialists and the idealists; the first class founds upon experience, the second on consciousness. The materialist depends on facts; the idealist on the power of thought and will, on inspiration or intuition. The idealist concedes all that the materialist affirms, but the idealist seeks assurance for his sense impressions. He does not deny the sensory experience, but he must interpret it according to the spiritual. Therefore he views every natural object from the position of 'conscious interpretation.' "The idealist takes his departure from his consciousness, and reckons the world an appearance" (24, p. 344). To him, mind is the only reality; it is reflected in everything. Nature, literature, and history are subjective facts. Man is divine; he shares the self-existence of Deity. The world is a shadow of man, created by him. The transcendentalist accepts the entire spiritual doctrine; he believes in miracles, in intuition, and in ecstasy. He connects the beauty and simplicity of nature with the practical issues of life and attempts to realize the beauty of nature in all walks of life. The material progress is only temporary "like the shells which sprinkle the sea-beach with a white colony to-day, forever renewed to be forever destroyed" (24, p. 359). But ideal philosophy and teaching "shall abide in beauty and strength to reorganize themselves in nature, to invest themselves anew in other, perhaps higher endowed and happier mixed clay than ours, in fuller union with the surrounding system" (24, p. 359).

The essay, 'The Oversoul,' discloses Emerson's idea of the soul. He recognizes a higher origin for events than 'the will I call mine.' The theory of identity is expressed here. There is one great, supreme, impersonal soul which flows through the entire universe and centers itself in man. It is the light which shines through life. Before it, time, space,

and nature shrink away. In every act of the soul there is a union with God. Therefore man is divine and, if he will allow the great soul to flow freely through his own (by subduing his will), he will be capable of divine wisdom. This uninterrupted tide of the soul surges through every individual and thus the world of beings is united.

Herein the doctrine which is basic in making the church essentially a compensatory mechanism is stressed. The soul of man and the soul of God are continuous; man has access to divine power; man can become that which he will provided he obtains access to the continuous soul. This is accomplished through the church.

The elusive mechanism which makes possible this continuity has been designated, variously, intuition, the subconscious, the soul. G. A. Coe calls it the 'something more' feeling in an individual (25, p. 198). Visions and voices that seem to convey information, premonitions, sudden knowledge regarding a hazy problem—all are experiences of the 'something more' feeling. Henry Ward Beecher says:

There are times when it is not I who is talking;—when I have feelings that are so different from any that belong to the lower or normal condition that I can neither regulate them nor understand them (25, p. 200).

Goethe expresses it in this way:

All productivity of the highest kind, every important idea, every great thought which is followed by fruit and has consequences, is in no one's control, and is elevated above all earthly power (25, p. 200).

And Emerson says:

It is a secret which every intellectual man quickly learns, that beyond the energy of his possessed and conscious intellect he is capable of a new energy (as of an intellect doubled upon itself), by abandonment to the nature of things (25, pp. 200-201).

This force, other than the conscious, is what certain psychologists term the subconscious. It is surely a constantly recurring, every-day affair. The following theory seems to explain the belief in intuition so prevalent among religious

leaders. Inspirations or intuitions, however new they may seem, are but reproductions of experiences used in ordinary thought reproduction and association. One feels that ideas are new or original when he is but paraphrasing what he has heard or read at some previous time. The ideas do not occupy the focus of attention; they are found in the subconscious, *i.e.* the seat of forgotten experiences and of persistent habits not fully replaced by new ones. G. A. Coe tells of an unlettered Scotch woman who came to her pastor telling him that she had a message from the Lord (25, pp. 203f). Thereupon, she delivered in English, a tongue not ordinarily at her command, a truly eloquent passage about the Dissenters. Inquiry proved that the young woman had been housemaid for an eloquent English minister who had a habit of rehearsing his thoughts aloud at home. These thoughts had been received unconsciously by the woman. Originality of the subconscious is parallel to originality of the conscious, taking place only in the light of past experience and in terms of an individual's constitutional make-up. There appears to be an unconscious organization of certain experiences wherein the dim impressions are grouped and arrive finally at a focus of attention. The organization and elaboration depend upon the capacity of the individual. Only a musician is capable of musical inspiration; a poet of poetical genius; and only to a person trained in mathematics come mathematical solutions. Emerson's poetical nature, his great purity of heart, his intellectual capacity and scope, and the beauty and serenity of his nature made it possible for his subconscious nature to develop into the rich and extensive organism which is so remarkable in its apparent inspirational genius. What he thinks of as revelations, we explain as a coming into the foreground of what was growing in the background (subconsciousness) as a result of repeated and forgotten reaction.

JOHN BUNYAN

In a similar way one may account for the inspirational light and communication that have characterized many of

the leaders of the church. In many unstable persons, emotional experiences of youth persist and appear later as obsessions. The obsessions are often so deep-seated and recurrent that a veritable dissociation of personality occurs. John Bunyan is a case in which religious zeal was obviously the result of obsession. He was a typical psychopath, beset by fears and doubts. His life was marked by a train of torturing doubts and driving fears. He must atone for his indulgence and sin! He was a victim of automatisms, both motor and sensory. The voices that he heard usually quoted texts from the scripture. These voices often rebuked him by quoting damnatory phrases.

It is not difficult for the student of psychology to understand these voices. Nothing transcendental is needed. The voices simply reiterated phrases that (although sometimes apparently forgotten) persisted in what we shall call the subconscious.⁴ Many of the excerpts were strong reprimands to the deluded, torturing Bunyan. The persecutory obsessions appeared frequently in the guise of voices, driving Bunyan to religious frenzy and zeal.

As life advanced, Bunyan experienced almost pathological anxiety regarding his sinfulness. The voices appeared more and more frequently, the invectives appeared more bitter, his life became almost unbearable.

I durst not take a pin or stick, though but so big as a straw, for my conscience now was sore, and would smart at every touch; I could not tell how to speak my words, for fear I should misplace them. Oh, how gingerly did I then go, in all I did or said. I found myself as on a miry log that shook if I did but stir; and was as there left both by God and Christ, and the spirit, and all good things (13, pp. 157-158).

Some may be inclined to attribute the religious frenzy of Bunyan to the age in which he lived. The following testimony on the part of Bunyan cannot be attributed to the age in which he lived. Certainly the following introspective account is not typical of the normal man of any age.

⁴The writers' concept of the subconscious has been set forth more fully in a previous article. See 'Ability versus Effective Ability,' *PSYCHOL. REV.*, 1927, 34, 364-376.

And now I was sorry that God had made me a man. The beasts, birds, fishes, etc., I blessed their condition, for they had not a sinful nature; they were not obnoxious to the wrath of God; they were not to go to hell-fire after death. I could therefore have rejoiced, had my condition been as any of theirs. Now I blessed the condition of the dog and toad, yea, gladly would I have been in the condition of the dog or horse, for I knew they had no soul to perish under the everlasting weight of Hell or Sin, as mine was like to do. Nay, and though I saw this, felt this, and was broken to pieces with it, yet that which added to my sorrow was, that I could not find with all my soul that I did desire deliverance. My heart was at times exceedingly hard. If I would have given a thousand pounds for a tear, I could not shed one; no, nor sometimes scarce desire to shed one (13, pp. 157-158).

To experience over a period of years such conflict must have driven Bunyan to intense effort to escape. Suicide would have been one means of escape, but he was afraid to die.

The extent of Bunyan's obsession is described in the following quotation:

Bunyan had an obsession of the words, 'sell Christ for this, sell him for that, sell him, sell him!' which would run through his mind a hundred times together, until one day out of breath with retorting, 'I will not, I will not,' he impulsively said, 'Let him go if he will,' and this loss of the battle kept him in despair for over a year (13, p. 170).

Several interesting analyses have been made of Bunyan. Brown, Cowles, Venables, Froude and others have engaged in patient research and have contributed revealing data. Josiah Royce has reported a careful study of the life and work of John Bunyan (26). He objects to the tendency to multiply terminology by classifying morbidly insistent feelings, thoughts, and volitions as endless 'manias' and 'phobias.' His work is a straight-forward and sympathetic account of the nervous disorder and genius of a great character. Royce points out that in Bunyan we have a typical case of congenital mental disorder. From earliest youth, Bunyan exhibited unmistakable symptoms of nervous instability; he was beset

in childhood with frequent nocturnal and even diurnal terrors. He experienced religious anxieties with periods of melancholic depression. After an early marriage, under the strain of poverty and anxiety, he developed habits of insistent dread and doubt which exaggerated his congenital weakness. Royce classifies him as a neurasthenic type in which there appeared a highly systematized mass of insistent motor speech-functions of the most painful sort, accompanied by fears, doubts, and questioning. Under self-imposed regimen, Bunyan is alleged to have conquered his 'systematized disorders' and subsequently endured the burden of continuous work with considerable success. However, he remained always a prey to deep depression of mood and elementary insistent temptations.

No one can read 'Grace Abounding' without granting the genius of Bunyan. Nor can this work be read without the feeling that herein one has revealed the pitiful conflicts of a congenitally afflicted neuropath. 'Pilgrim's Progress' is undoubtedly a work of art. The connection between Bunyan's instability and the production of this work is apparent. Bunyan's 'visions' are well known to the student of biography. There are frequent allusions to visions in every biography of Bunyan. Royce comments particularly upon the importance of a 'condemnatory vision' appearing shortly after his marriage. A sermon upon Sabbath-breaking was the immediate stimulus for the vision. As was his habit, Bunyan was playing cat-ball upon a Sunday afternoon. He looked up to Heaven, there saw the threatening vision, condemning him for his sin.

The automatic internal vision was seen with extraordinary detail and with strong emotional accompaniment at this time; it appeared henceforth frequently and became 'the main source of his peculiar artistic power' (26, p. 32). "This power of vision remained, as the 'Pilgrim's Progress' itself shows late in life; and without it our dreamer's genius could not be conceived" (26, p. 32).

Royce asserts that the appearance of visions is an important determiner of the direction of the effort of Bunyan

and therefore of the nature of his work. He insists however that Bunyan's disorder was not correctly defined by Macaulay as 'hallucinatory delirium.'

Royce holds also that 'Pilgrim's Progress' is in part a manifestation of the voices which Bunyan heard, yet he states that Bunyan's mind was not 'fearfully disordered' and that Macaulay, Taine, and Froude have interpreted the man incorrectly when they state that 'Pilgrim's Progress' was the outcome of an 'inflamed brain.' Nevertheless, Royce holds that all of Bunyan's writing (some 60 tomes) was affected by the 'voices' which themselves were expressions of a neuro-pathic constitution.

OTHER RELIGIOUS LEADERS

The student of theological history knows that many of the saints were victims of obsessions similar to those experienced by Bunyan. In earlier centuries such obsessions were ascribed to the direct agency of Satan. To-day their origin is better understood. They are now ascribed to organic defects of various sorts and to impelling unconscious motives. Obsessions which have marked the lives of religious leaders have often resulted in work that has had tremendous social significance. St. Augustine appears to have been such a case. St. Augustine was characterized by a dissociated personality. James tells of how St. Augustine heard voices.

Let me quote from some typical cases of discordant personality, with melancholy in the form of self-condemnation and sense of sin. Saint Augustine's case is a classic example. You all remember his half-pagan, half-Christian bringing up at Carthage, his emigration to Rome and Milan, his adoption of Manicheism and subsequent skepticism, and his restless search for truth and purity of life; and finally how, distracted by the struggle between the two souls in his breast, and ashamed of his own weakness of will, when so many others whom he knew and knew of had thrown off the shackles of sensuality and dedicated themselves to chastity and the higher life, he heard a voice in the garden say, '*Sume, lege*' (take and read), and opening the Bible at random, saw the text, 'not in chambering and wantonness,' etc., which seemed directly sent to his address, and laid the inner storm to rest forever.

Augustine's psychological genius has given an account of the trouble of having a divided self which has never been surpassed (13, pp. 171-172).

Nothing has been more consequential for the subsequent intellectual and social history of mankind than St. Augustine's notorious 'impurity complex' which he fastened upon European thought so successfully and so deeply that the world to-day has not recovered from it. Barnes (28) asserts that St. Augustine's impurity complex was a psychic compensation for his own wild youth and his varied and extensive experiences. Barnes' explanation may be another instance of over-simplification. Certainly it is not true that every wild youth later experiences psychic compensation. St. Augustine had a discordant personality; his melancholia took the form of self-condemnation. St. Augustine would be described to-day as a multiple personality.

If we turn to Islam, we find Mohammed an important leader who was undoubtedly a psychopath.

Mohammed is said to have answered that sometimes he heard a knell as from a bell, and that this had the strongest effect on him; and when the angel went away, he had received the revelation. Sometimes again he held converse with the angel as with a man, so as easily to understand his words. The later authorities, however, . . . distinguish still other kinds. In the Itgau (103) the following are enumerated: 1, revelations with sound of bell; 2, by inspiration of the holy spirit in M's heart; 3, by Gabriel in human form; 4, by God immediately, etc., etc. (13, pp. 481-482).

The careers of Bunyan, St. Augustine, and Mohammed do not stand alone. Religious history records many unstable beings tortured into frenzy by persistent obsessions.⁵ The writers would not go so far as to assert with James that religious genius *is invariably accompanied by nervous disturbance*. However, they believe that the preceding citations indicate that, for certain religious leaders, religion has oper-

⁵ This fact is sometimes rationalized by asserting 'Whom the Lord loveth He chasteneth,' a phrase which implies that the extremely devout are often apparently the most sorely tried individuals. If the contention of the present writers be valid it follows that in the preceding phrase cause and effect are reversed.

ated as an intensely satisfying avenue of escape. They believe moreover that, in so far as the religious genius is concerned, the eccentricity of genius is not wholly a myth.

SUMMARY

The past has encompassed many bitter clashes of opinion regarding the sanity of genius. Nisbet (29), Nordau (30), *et al.* asserted that genius is usually associated with nervous instability or insanity. Violent reactions followed the dogmatic generalizations of these writers. The controversy was at its height about 1890-1900 and subsided somewhat during the next two decades.

With the development of the mental test and the dissemination of information gleaned therefrom, renewed interest in the genius appeared. The difficulty of defining and isolating genius now was reduced, for the intelligence test data were considered valid in the identification of the fortunate deviates. Genetic study followed the identification and a new body of literature appeared.

Terman's 'Genetic Studies of Genius' (Vol. I.) gives the results of genetic study of a large number of children of high I.Q. That Terman accepts the validity of the intelligence test as a measure of genius is apparent in the title, 'Genetic Studies of Genius.' His belief that the gifted child is a genius in the making is evident in the following: "The next logical step is the study of genius in the making, that is the investigation of gifted children" (27). Terman has asserted further that from the ranks of the *gifted* (children of high I.Q.) will come our future geniuses in every line of endeavor.

Since children of high I.Q. are to be the leaders of the future, it will be of advantage to study the nervous stability of the potentially great. If one accept the postulate that gifted children will become effective geniuses it is of course possible to assemble much valuable information regarding the nature of genius. It is possible also to learn much regarding the nervous stability of the potentially great and to throw light upon the age-old question raised by Nisbet,

et al. The genetic studies by Terman show that the children of high I.Q. are unusually well-balanced. Hence the amazing generalization of Terman that the eccentricity of genius is largely a myth! Children of high I.Q. are to become the geniuses of the future—*ipso facto* the eccentricity of genius is a myth. Corroborative evidence of Terman's position is offered in the work of Miss Cox who studied 300 men of proven genius. Miss Cox asserts that geniuses in general are characterized by their nervous stability and balance.

The writers of this article are reluctant to accept these hasty generalizations. They have examined the biographies of some notable leaders in religious activities in an attempt to see if the leaders in this type of endeavor are well-balanced and stable.

The examples cited in this paper are not in accord with the assertion that the eccentricity of genius is largely a myth. Indeed, careful study of reformers and religious leaders leads one to conclude that one of the most notable characteristics of these men is their instability.

It may be that the assumption of early writers to the effect that the work of genius was a manifestation of instability was a hasty generalization and one that was not founded on fact. However, the more recent assumption that the eccentricity of genius is largely a myth is probably also an example of hasty generalization. Certainly, this more recent assumption is not proved by the test results obtained by examining gifted children, since it has not been proved that every gifted child is necessarily a genius. Neither has it been proved that every recognized genius was a gifted child.

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A REINTERPRETATION OF THE COLOR-PYRAMID

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The establishment of gray as a fundamental visual quality and not a mixture of black and white necessitates a reconsideration of the color-pyramid and its theoretical implications.¹ This schematic representation of the facts of color experience was figured in 1897 by Höfler² and Ebbinghaus,³ and in 1898 by Titchener.⁴ Höfler's version has the form of a regular octahedron. That of Ebbinghaus differs in that the base is tilted about the red-green axis with the yellow corner nearer white and the blue corner nearer black, and the corners are blunted. Titchener's first pyramid is like that of Höfler save that the black-white axis is doubled in length. The reason for this appears to be psycho-physical. In his exposition of the figure he builds it upward and downward from the base by a series of similar squares, one for every j.n.d. of brightness of gray. Later he includes Ebbinghaus' modifications in a final version.⁵ It is not obvious that the deviations from Höfler's regular octahedron have added to the clarity of the figure. If it is true, as Titchener says in speaking at a later date of certain of the color series, that "so long as they are included in the original color pyramid, they are qualitative, and can be nothing else,"⁶ there would seem to be nothing gained by, and no excuse for, permitting psycho-physical or other considerations to alter the psychological

¹ Dimmick, F. L., 'A Note on the Series of Blacks, Grays, and Whites,' *Amer. J. Psychol.*, 1920, 31, 301.

Rich, G. J., 'Black and Gray in Visual Theory,' *Amer. J. Psychol.*, 1926, 37, 123.

² Höfler, A., 'Psychologie,' 1897, p. 113; 'Grundlehren der Psychologie,' 1897, p. 35.

³ Ebbinghaus, 'Grundzüge der Psychologie,' 1897-1901, p. 104.

⁴ Titchener, E. B., 'A Primer of Psychology,' 1898, pp. 40f.

⁵ Titchener, E. B., 'A Demonstrational Color-Pyramid,' *Amer. J. Psychol.*, 1909, 20, pp. 15-21.

⁶ Titchener, E. B., 'Visual Intensity,' *Amer. J. Psychol.*, 1923, 34, p. 310.

implications. The basic reason for representing colors in a figure of corners, lines, and plane surfaces in preference to one of circles and spherical or conical surfaces is the psychological observation that every one of the colors, red, yellow, green, blue, black, and white, is totally unlike every other one. They are *unique* in this respect and so stand at the corners of the figure. There is no reason for supposing that there are different degrees of uniqueness for the several fundamental colors. Every series which runs from one unique color to another involves a maximum psychological change; hence the corners must be represented as equidistant from one another, and the figure must be regular and equilateral. This should hold of all the qualitative series involved whether the end points are unique or intermediate colors. Here we get the first indication that Euclidian space is not fully adequate to the representation of the psychological facts, and we must content ourselves with a precise spatial representation of only a few of the series, viz., those which form the edges of the figure or involve only two variables. Also the unique colors with which we are dealing are theoretical and abstract color concepts and not concrete colors. The fact that it may be difficult or impossible to get a perfect or unique red, or blue, or black, etc., does not justify us in distorting the theoretical implications of the figure. If we were to base our color-pyramid upon available color stimuli, we should get something which stands to the true pyramid as the spectral band does to the color triangle,⁷ save that the greater complexity of our figure would give us a more grossly distorted result. For example, if we retract the corners because we cannot obtain concretely the colors which they represent, we must for the same reason retract the edges and sides. If this retraction is proportional throughout, the figure remains intact, but if other practical considerations or the psycho-physical characteristics of the various series are allowed to alter the proportion of the retraction our figure soon loses its essential psychological characteristics.

A further consideration remains which bears upon the

⁷ Cf. Parsons, J. H., 'Color Vision,' 1924, pp. 42f.

shape of the figure. This is the implication of the answer to the question, "Is yellow intrinsically whitish and blue intrinsically blackish?" A positive answer has been widely assumed but its accuracy is questionable. Yellow *objects* tend to a large extent to be whitish also and blue *objects* to be blackish but we doubt whether the color affinity that is supposed to exist has a qualitative basis.

We come back, then, to the regular octahedron of Höfler as the figure which most adequately represents the psychological facts of visual quality. As we have already indicated, however, certain ambiguities remain and become particularly confusing as we go from the planes of the surfaces to the interior of the pyramid, *i.e.*, when we introduce gray. The pyramid is geometrically tridimensional and it has been customary to ascribe a single mode of color change to each of these three dimensions. Unfortunately, however, the psychological 'dimensions' refuse to adhere each to its own geometrical dimension. Parallel lines in the base may represent hue, or chroma, or both, although by geometrical implication only one dimension is involved. Similarly, red is said to decrease in chroma as it approaches white but not as it approaches yellow. Both series involve a decrease of red but neither involves gray and the end points are equally unique. The establishment of gray as a principal or unique color quality gives us the basis for solving these ambiguities.

We have now seven points of reference for determining the quality of any color. Fortunately, the complementariness of the three color pairs reduces the maximum number of unique colors involved at any time to four, one of which is always gray. Thus the characteristics of the most 'complex' color are expressed by the equation,

$$x \begin{pmatrix} \text{red} \\ \text{green} \end{pmatrix} + y \begin{pmatrix} \text{blue} \\ \text{yellow} \end{pmatrix} + z \begin{pmatrix} \text{black} \\ \text{white} \end{pmatrix} + g(\text{gray}) \\ = c \text{ (the constant visual intensity).}$$

The four-dimensional character of this equation makes it obvious why the three geometrical dimensions of the color-pyramid cannot be ascribed each a psychological significance.

This means that we can dispense with the equivocal terms, tint, shade, saturation, chroma, brightness, etc., and precisely characterize a color by determining its equation. We could call each one of the four dimensions a distinct qualitative attribute but the concept of unique qualities is simpler and fully adequate. Certainly there is no reason for ascribing special attributes to *two* of the dimensions and treating the other two as one. Of course, it is not easy nor is it necessary to dismiss the above terms if we give them a precise definition. Chroma, as Titchener uses it, or saturation, is the qualitative aspect of his 'pro-intensive' series and varies in all those series which form "a star or sunburst whose nucleus is gray, and whose rays extend from the nucleus to all points on the surface of the 'pyramid.' . . . They represent our nearest approach to visual intensities."⁸ From this angle the former 'pure tint' series, gray to white and gray to black, become a pair of particular chroma or 'pro-intensive' series. If we shift our point of departure the tint, brightness, or black and white aspects can be emphasized. From the white apex as a focus the brightness or tint lines spread out in a beam which extends to the color square. The darkness or shade lines extend in a similar beam from black to the color square. Thus the chromas, and the tints and shades are co-extensive but imply different points of reference. The only reasons for giving the series from black and from white special treatment are pseudo-physical and historical. Any one of the corners of the pyramid may be taken as the focal point of a set of radiating series all of which contain a common element in varying proportions. Gray alone holds the peculiar position such that its radiating series make up the entire pyramid within the theoretical surfaces. It is this peculiarity of gray that permits of its treatment as the 'minimum visual intensity' and the o-point of the 'pro-intensive' series, though there seems to be no psychological reason for ascribing to any color quality a greater or less absolute intensity.

This understanding of the psychological implications of the color-pyramid is in no sense a physiological color theory.

⁸ Titchener, E. B., *loc. cit.*

The observations upon which it is based are prior to such considerations but they may justly form a part of the basic requirements which an adequate theory must satisfy. There seems to be no theory at present which is acceptable at the same time to the physicists, the physiologists, and the psychologists. This is due largely to the fact that the first two are prone in their theorizations to neglect psychological facts of primary importance. Frequently it is the urge toward simplicity that is the reason for this neglect. On the other hand, not many psychologists are equipped to erect a physical or physiological theory that is adequate. Nevertheless it is within their province to select from the theories that are offered those things which are in accord with psychological observation and to reject those which are not. It is something of this sort that Rich⁹ has done recently and has called 'An Eclectic Theory of Vision.' His eclecticism is involved almost entirely with the Hering and the Ladd-Franklin theories. To the combination and interpretation of them he has brought a number of more recent psychological observations. The resultant theory is an obvious improvement upon prior theories but it, too, errs in the direction of neglect of, or of insufficient stress upon, certain psychological requirements. Nor does it add anything to our understanding of the physics and the physiology involved.

It is difficult to tell in Rich's interpretation of Ladd-Franklin's theory just where the genetic argument leaves off and where the picture of the functioning of the human retina begins. This theory makes too much of the fact that the mixture of psychologically 'pure' red and green gives a color that is tinged with yellow, and too little of the fact that both the red and the green disappear. The residual yellow may be due, on the genetic hypothesis, to a slight sensitivity which the yellow-process has retained to both red and green and which is evident only when the activities of the red and green excitatory processes are at zero. The alternative that yellow (in the inner zone of the retina) is always due to the combined activity of the red and green excitatory processes is not

⁹ Rich, G. J., 'An Eclectic Theory of Vision,' *PSYCHOL. REV.*, 1928, 35, p. 311-318.

indicated by the unique characteristics of yellow. We can agree with the genetic picture of the successive differentiation of the several sensitivities of the retina but it seems to us that the facts point to two pairs of excitatory processes, one for red and green, and one for blue and yellow.

We agree with Rich, naturally, in his criticism of Ladd-Franklin's treatment of black, gray and white, but we must take issue with him in regard to the intensity of gray on the basis of what we have said earlier in this paper. Titchener, to whom Rich refers, is much less positive about gray being 'the minimum of sensory intensity.' He says, "I suggest that the lines [from gray] . . . may be called *pro-intensive*¹⁰ series. . . . It remains a question whether the pro-intensive series can be handled, in direct psychological observation and without recourse to perceptive analogy as intensive. At any rate, it seems plausible to suppose that gray stands as the minimum of visual intensity at large (though I confess I am not quite sure how far psycho-physical considerations are involved in this plausibility)." ¹¹ Gray is much more obviously a psychological quality than it is an intensity.

In the matter of the physiological basis for gray, Rich's exposition is somewhat ambiguous. Near the beginning of it, he says, "But the fact that gray is the sensation resulting from stimulation by heterogeneous light of moderate intensity indicates that it is the most primitive of the sensory processes of the human eye. Gray is to be explained by the hypothesis of a photochemical substance or color molecule . . . which is sensitive to light in the same way that the substances contained in the cells of other receptors are sensitive to their particular type of adequate stimulation." Later in the discussion he states, "At this stage of differentiation the constancy of visual experience is present and must be accounted for. . . . Some constant visual process must be assumed, for one always sees something." This latter statement is, of course, precisely in accord with the facts and Rich's physiological interpretation of them seems highly probable. The

¹⁰ The italics are ours.

¹¹ Titchener, E. B., *loc. cit.*

significance of the earlier 'fact' is not at all obvious. If Rich meant it as a genetic speculation, it would seem plausible, but he implies its present physiological existence, for he uses it as the explanation of the facts of twilight vision in preference to the theory of von Kries. He appears, therefore, to have two mechanisms for mediating gray, only one of which seems to us to be necessary and acceptable.

We must consider further Rich's substitution of his gray-molecule for the theory of dual vision. It is understating the facts to say that 'in night vision only gray is seen.' Of course, gray is seen, but in view of the fact that gray is a simple quality, if 'only gray' were seen as Rich states, there ought to be no differentiations within this gray. The fact is, however, that the grays are differentiated as more or less whitish (never blackish in twilight vision) and this whitishness differs from the usual white of daylight in that it is a bluish white and apparently does not have a negative after-image. As von Kries proposed, these facts indicate a separate, highly sensitive mechanism which mediates various intensities of bluish white and which is distinct from, but superimposed upon, the constant gray process.

A final question may be raised as to whether the 'color-molecule' of Ladd-Franklin really tells us what happens or can happen in the retina. An adequate answer to this question must come from the physiologist and the physicist. A new theory from the physical point of view¹² appears promising though it needs modification before it becomes fully satisfactory for psychology. The principal contributions of this theory are (1) a second light-sensitive substance which is less sensitive than the 'visual purple' and has different absorption characteristics, and (2) a reflecting-interference mechanism which sets up selective blue-yellow or green-red (increase or decrease from the idio-retinal level) excitations of the light-sensitive substance in the respective cones. The other assumptions necessary to the hypothesis are not essentially new. As usual the physicist has taken no account

¹² Forbes, W. T. M., 'An Interference Theory of Color Vision,' *Amer. J. Psychol.*, 1928, 40, pp. 1-25.

of the qualitative nature of black, gray and white. It appears perfectly feasible, however, to posit a third selective mechanism for white-black excitations similar to those for the other colors. The idio-retinal activity already postulated will serve as the basis for gray.

SUMMARY

An adequate consideration of the psychological facts of vision must begin with the color pyramid. Its geometry has obscured many of its psychological implications. Any color in it can be described most adequately by the qualitative equation:

$$x \begin{pmatrix} \text{red} \\ \text{green} \end{pmatrix} + y \begin{pmatrix} \text{yellow} \\ \text{blue} \end{pmatrix} + z \begin{pmatrix} \text{white} \\ \text{black} \end{pmatrix} + g(\text{gray}) = c.$$

The distinction of hue, tint, and chroma as separate attributes appears to be without psychological basis. All three consist of systems of qualitative series of the same order, differing only in their points of reference.

In our critical remarks on the two most recent theories of the visual mechanism we have endeavored to point out several requirements which it seems to us must be fulfilled if a theory is to be acceptable for psychological purposes. Such a theory must satisfy the color equation given above, it must take account of the other phenomena of complementariness, and it must provide for the qualitative peculiarities of scotopic vision.

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DISCUSSION

FURTHER REMARKS UPON CHARACTER TESTING

In an earlier article the present writers pointed to some glaring examples of Magic in the use of tests of character and urged that workers interpret their data specifically in terms of the test situation (2). Professor Herbert Woodrow replied that the attempt to measure various character and personality traits has become in recent years one of the most noteworthy developments in the field of mental testing. From his paper, it is clear that he has the impression that the present writers wish to 'belittle the whole movement' (3, p. 338).

This impression on the part of Professor Woodrow is of course entirely erroneous. The writers do not intentionally belittle sincere and honest research in any field whatsoever. What the writers do object to is the employment of that species of Magic brilliantly discussed by H. M. Johnson in an article mentioned below. (1)

In the writers' previous article (2) it was asserted that attempts to measure general character are usually futile because character is acquired in terms of habits of action, *specifics* always, and that most tests of character fail to take into account or measure the numerous elements which make up the totality. Woodrow asserts (3, p. 330) that the argument of the writers implies that the attempt to measure *any* trait which is acquired in terms of habits of action is open to criticism. Certainly, the writers never intended such an implication and how such an inference could be drawn is bewildering to them.

The writers insist upon setting up specifics as goals and measuring the acquisitions of them. They object to a pseudo-science which measures one thing and calls it by another name. H. M. Johnson in a recent number of this Journal pointed out clearly and effectively this tendency in the new science of psychology. Johnson insisted that the clarity is always impaired if two non-equivalent things are called by the same name. The writers agree with H. M. Johnson in his insistence that Scientific Method requires a distinction between *equivocance* and *equivalence*. Woodrow states (p. 339) that "ability in the fundamentals of

arithmetic, for example, is acquired in terms of habits of *action*, and most people regard it as desirable, or necessary for certain purposes, to attempt its measurement. Is the measurement of such ability spurious and unnecessary?" Here of course the writers would insist that ability be defined specifically and then measured. They would object violently to the practice of measuring reading ability and assuming, because the correlation of reading ability with teachers' judgments of arithmetical ability was (say) $+ .45$, that the test of reading ability constitutes a very good measure of arithmetical ability.¹ Let us hasten to add (for fear of misunderstanding) that a battery of tests (including reading) might be assembled which would predict the child's success in certain phases of arithmetic. Of course, such a test would not be a measure of the child's knowledge of arithmetic.

The writers stated that Woodrow and Bemmels probably consider character to be unitary. Woodrow replies with his definition of character as "the average development attained in all desirable specific traits of character" (p. 341). The number of these specific traits is very large. "... a list of two hundred traits constitutes but a small proportion of the total" (p. 341).

The writers are not quarreling with Woodrow in his *definition of general character* (although they would have defined it in a somewhat different manner). Their charge against him to the effect that he must consider general character to be unitary was based upon *what he actually did*; not upon his definition. What Woodrow did was to measure the tendency to overstatement in pre-school children. The results were correlated with teachers' judgments of general character; he then concluded that "the overstatement test constitutes a very good measure of general character in pre-school children." Woodrow's definition of general character implied the existence of hundreds of elements. He measured only one (or one group) and then resorted to the chicanery of Magic.

¹ Woodrow and Bemmels studied two groups of children (4). The groups contained 17 five-year-old, and 14 four-year-old children respectively. The correlation between the amalgamated rank in character and overstatement was $+ .56 \pm .12$ for the five-year-old group, and $+ .43 \pm .15$ for the four-year-old group. The authors concluded that the overstatement test constitutes a very good test of general character in pre-school children. They assert that "it would not take a large battery of tests as good as this one (providing the intercorrelation between them was moderate) to yield a very satisfactory measure."

Hull has shown (5) that the efficiency of an r of $+ .43$ is only about ten per cent better than zero predictive value, and that an r of $+ .56$ is only about eighteen per cent better than zero. It is therefore obvious that Woodrow overestimates grossly the value of an overstatement test as a measure of general character.

The writers attacked the procedure of Woodrow and Bemmels upon several other scores, *not upon their definitions but largely upon their practice.*

Woodrow asserts that "All definitions are arbitrary, and if one wishes to use ratings as a tentative, experimental criterion of character, and to define character in terms of this criterion . . . who can deny him the privilege?" (p. 344). Johnson has already met this stock argument in a rather thorough-going manner (1). Although the present writers feel that a brief summarization fails to do justice to Johnson's paper, the point of view of the writer may be well illustrated by the following excerpts from his paper.

1. In the first and least important place, it may be replied that such reasoning is inconsistent with the definition of a 'test' as an 'indirect measure.' The official papers of the War Department do not indicate that the Alpha and Beta 'tests' were recommended for adoption on the ground that the score of each individual indicated merely what his score actually was. It was assumed that the tests were indirect measures of intelligence.

2. The fashion of naming 'test-performances' arbitrarily may introduce great confusion in case the same name should be applied to more than one performance. Suppose two performances are called 'tests of intelligence'; shall we therefore assume that they 'measure' the same thing? If we did so, trouble would soon arise, for it may happen that the score in one performance is not a very effective index of the score in the other. . . . The number of kinds of 'intelligence' would then tend to approach the number of performances whose scores define them; to distinguish among these 'intelligences' we need as many names as there are defining performances.

3. Can one produce a single paper in which the author arbitrarily defines a trait as whatever a certain performance measures, and then adheres to his definition? I have yet to find one. . . .

The confusion that results from the practice that is advocated by Woodrow is well illustrated by the gradual change in terminology that has come about among certain testers of intelligence. At first the mental tester claimed that he measured 'general intelligence.' It may be that the tester was incapable, as suggested by Johnson, of adhering to his arbitrary definition of general intelligence. On the other hand it may be that his hearers were confused by the arbitrary definition. In any event certain writers gradually came to modify their claims and to employ the qualifying phrase 'general intelligence as measured by the X test of intelligence.' To-day many careful writers seem to omit entirely the words 'general intelligence' and to refer instead to 'that which the

X test measures.' The term 'Scholastic Aptitude Test' is occasionally used when the results of the so-called intelligence tests are referred to. However, the metamorphosis has been very gradual and is even now far from complete. Some workers still seem convinced that they are able to measure general personality traits despite the fact that the problem is complicated by a lack of common terminology and definition.

The above citation clearly illustrates the fact that for every worker to define 'general character' in an arbitrary fashion will help the problem of measurement only to a small degree.² There is an effective channel of outlet in this confusing task of measuring aspects of personality. If workers in the field of character testing will interpret their data only in terms of the test situation, it will not be necessary for them later to disentangle themselves from the confusing terminology with which they are optimistically struggling.

Woodrow asserts that "It is likely that much of the alarm felt in certain quarters over the attempt of psychologists to measure such traits as intelligence, character, honesty, etc., would immediately vanish, once the proposed tests were designated by unfamiliar, non-traditional names . . ." (p. 350).

But why should psychologists go further in this direction than they already have gone? The creation of an additional set of symbols would simply complicate a none-too-clear process! The English languages can be made to express things in fairly understandable terms. The present writers, for this reason, do not find themselves in sympathy with Woodrow's final statement, namely, that "If . . . conventional, traditional terms continue to be employed in referring to tests, it should be realized that these terms are simply vague, tentative, labels, which should not be taken too seriously" (p. 350). Why not use language that is less vague?

To sum up the contention of the present paper: Psychology is greatly handicapped when forced to use terms which carry vague and ambiguous meaning. In so far as the writers are aware, this proposition is quite generally conceded. Specifically, the writers have sought in their earlier paper to condemn this practice in so far as it relates to the measurement of 'general character.' Professor Woodrow's reply to that paper indicates that the writers may have failed to make their point as clear as might be desired.

² Such a practice would assist appreciably if the workers adhered in their practice to the definition.

It is hoped that this paper will summarize with sufficient succinctness the point of view of the writers to leave no question of their position.

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[MS. received October 31, 1928]

A NOTE ON ANTHROPOMORPHISM

It is one of the curiosities of present psychological discussion that those scientists who are the most vehement in their denunciation of anthropomorphic descriptions of animal behavior are the very ones who are most confident that human behavior does not differ from animal in any important particular. If anthropomorphic terms are objectionable or misleading, it must be because they insinuate into the interpretation of animal activities certain principles that uniquely characterize human beings. But if human beings possess *no* unique characteristics, it is hard to see why terms descriptive of human behavior should not, with proper limitations, apply to animals as well.

Continuity is a principle that cuts both ways. If six is three times two, it is equally true that two is one third of six. A similar reversibility must obtain with reference to human beings and animals, if their behavior constitutes a series. If men are clever animals, animals must be very like stupid men. If science is only a game to be played according to arbitrary rules, we may consent, for our own pleasure, to the limitations imposed by Lloyd Morgan's Canon. Animals, however, can scarcely be aware of it. In any event they are under no obligations to observe it. And we *may* be better able to understand their behavior, if we follow an older,

and I think on the whole a more plausible, canon, "Put yourself in his place."

If animal and human behavior constitute an unbroken series, the psychologist might be thought free to choose either the 'higher' or the 'lower' terms of the series as the starting point for his explanations. It is not at all clear, to any mind that struggles to free itself from prejudices, why only the 'lowest' terms should be considered illuminating or permissible in science. On the contrary, it seems highly plausible that more complex organisms, and particularly human beings, may exhibit characteristics truly present in simpler forms but not to be discerned for the simple reason that they are as yet rudimentary, minute and undifferentiated. If this is so, the 'higher,' 'anthropomorphic' terms serve a useful end in calling to our attention features that would otherwise be overlooked.

If anthropomorphic terms are to be *taboo*, there must be something unique in human behavior, something that does *not* characterize the behavior of animals. Psychologists should by all means, then, bend their energies to the task of isolating and defining the differentiating feature. On the other hand, if there is nothing distinctive about human behavior, anthropomorphic terms are not only not objectionable but are often illuminating. This seems to be a dilemma. The shortest way out would be to place the *taboo* upon anthropomorphic terms even for the description of human behavior. But this suggestion can scarcely be offered otherwise than as a joke. When a 'scientific' method necessitates the description of human conduct in sub-human terms, it exhibits its own absurdity.

Is it possible that the vehemence of the anathemas hurled against anthropomorphism is a Freudian or Adlerian 'over-compensation' for muddled logic?

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